AN ACCOUNT OF THE GOING OF MR. JOHN HARRISON'S WATCH, AT THE ROYAL OBSERVATORY, FROM...

Nevil Maskelyne, Innocenzo Forlì Golfarelli

1312
XIV A 21

BIBLIOTECA NAZIONALE CENTRALE V.E.II ROMA
RC
1134

Biblioteca di orologeria
n. 86

12 B
86

AN

ACCOUNT

OF THE

GOING of Mr. John Harriſon's WATCH,

AT THE ROYAL OBSERVATORY,

FROM

MAY 6th, 1766, to MARCH 4th, 1767.

TOGETHER WITH

The Original Obſervations and Calculations of the ſame.

BY THE REVD. NEVIL MASKELYNE,
ASTRONOMER ROYAL.

PUBLISHED BY ORDER OF
THE COMMISSIONERS OF LONGITUDE.

LONDON:
PRINTED BY W. RICHARDSON AND S. CLARK;
AND SOLD BY
JOHN NOURSE, AND MESS. MOUNT AND PAGE.
M DCC LXVII.

1767

BVEE080639

RC 1134

Dono
ITREL 15GA

BIBLIOTECA NAZ.
ROMA
VITTORIO EMANUELE

AN
ACCOUNT
OF THE
GOING of Mr. John Harriſon's WATCH,
AT THE ROYAL OBSERVATORY,
From MAY 6th, 1766, to MARCH 4th, 1767.

THE Board of Longitude, at their meeting April 26th, 1766, having come to a reſolution that Mr. Harriſon's watch ſhould be tried at the Royal Obſervatory under my inſpection, as to the manner of its keeping time, according to a certain plan contained in the ſaid reſolution; I, accordingly, received the watch at the Admiralty on May 5th, 1766, from the hands of Philip Stephens, Eſq; ſecretary of the Admiralty, in the preſence of Capt. Thomas Baillie, of the Royal Hoſpital at Greenwich; Mr. John Ibbetſon, ſecretary of the Board of Longitude; and Mr. Larcum Kendal, watch-maker, who accompanied me with the watch to the

Royal Obſervatory, ſaw it put in motion, and locked up in the box provided for it: all which appears more fully from the annexed paper ſigned by Capt. Baillie, Mr. Ibbetſon, and Mr. Kendal.

I, moſt days, wound up and compared the watch with the tranſit clock of the Royal Obſervatory myſelf; at other times it was performed by my aſſiſtant Joſeph Dymond, and afterwards William Bayly: this was always done in the preſence of, and atteſted by one of the officers of Greenwich Hoſpital, when he came to aſſiſt in unlocking the box in which the watch is kept, in order to its being wound up. To prevent any miſtake, there were made always two or three compariſons of the watch with the clock, and I ſet down that compariſon at which the ſecond hand of the watch pointed to 60 exactly at the inſtant of the beat of the clock, which happened always once in ſix minutes, the watch being adapted to keep mean time, and the clock ſidereal time; and therefore the clock getting about a ſecond upon the watch every ſix minutes. By this method I aſcertained the compariſon of the watch with the clock to the twelfth part of a ſecond, without putting down fractions.

The tranſit clock, which was cleaned and put in order juſt before the watch arrived, was compared continually, as uſual, when the weather permitted, with obſerved tranſits of the ſun and fixed ſtars, whereby it appears to have kept very regular time, and not to have varied above a quarter of a ſecond, more or leſs, in one day, than in that preceding or following it.

From May 5th to May 17th, 1766, I kept the watch in a horizontal poſition with the face upwards; and from thence till July 6th I tried it, firſt inclined under an angle of 20° to the horizon, with the face upwards, and the hours XII, VI, III, IX, higheſt ſucceſſively; then in a vertical poſition, with the ſame hours higheſt in order; laſtly, in a horizontal poſition, with the face downwards. From July 6th to the preſent time it has been always kept in a horizontal poſition, with the face upwards, and lies upon the ſame cuſhions, and in the ſame box in which Mr. Harriſon kept it in the voyage to Barbadoes.

Here follow the computations which I have made of the rate of the going of the watch from day to day, from May 6th, 1766, the day after it was brought to the Royal Obſervatory, to March 4th laſt, deduced from the compariſons of the watch with the tranſit clock made in the preſence of, and atteſted by, the officers of Greenwich Hoſpital.

	1766, from		Watch gains on Mean Time per Day.	Mean State of the Thermometer.	Mean State of the Barometer.
			Sec.	Deg.	Inches.
Here the watch is in a horizontal poſition with the face upwards	May 6 to	7	17,6	54	29,9
	7	8	18,9	57	29,7
	8	9	20,1	55	29,5
	9	10	20,0	54	29,3
	10	11	18,9	49	29,5
	11	12	19,5	50	29,6
	12	13	19,9	51	29,6
	13	14	20,7	52	29,8
	14	15	19,7	52	30,1
	15	16	20,0	54	30,2
	16	17	19,3	56	30,1
Watch inclined 20° face upwards, and hour XII higheſt.	17	18	20,1	57	30,0
	18	19	20,3	55	29,9
	19	20	18,7	49	29,9
	20	21	18,7	51	30,0
	21	22	20,8	50	30,0
Watch inclined 20°, hour VI higheſt.	22	23	24,7	52	29,9
	23	24	23,5	53	29,8
	24	25	21,4	52	29,7
	25	26	19,1	55	29,7
	26	27	26,1	55	29,7
Watch inclined 20°, hour III higheſt.	27	28	12,6	52	29,6
	28	29	10,9	49	29,5
	29	30	14,2	54	29,4
	30	31	11,0	53	29,4
	31 to June	1	12,4	50	29,7
	June 1	2	13,1	51	29,9
	2	3	12,8	54	29,8
Watch inclined 20°, hour IX higheſt.	3	4	14,6	56	29,7
	4	5	14,4	57	29,6
	5	6	14,9	57	29,7
	6	7	11,4	59	29,7
	7	8	15,0	60	29,8

			Watch gains in mean Time per Day.	Mean State of the Thermometer.	Mean State of the Barometer.
			Sec.	Deg.	Inches.
	1766, from				
Watch vertical, hour XII higheſt.	June 8 to	June 9	30,2	60	29,9
	9	10	29,8	59	30,0
	10	11	29,1	60	29,9
	11	12	29,2	59	29,7
	12	13	29,3	56	29,8
			Loſes.		
Watch vertical, hour VI higheſt.	13	14	2,9	56	29,8
	14	15	2,0	57	29,7
	15	16	1,2	56	29,7
	16	17	1,6	57	29,6
	17	18	2,5	55	29,5
			Gains.		
Watch vertical, hour III higheſt.	18	19	3,9	56	29,6
	19	20	5,3	53	29,8
	20	21	1,7	56	29,9
	21	22	2,8	65	30,0
	22	23	4,0	61	30,2
Watch vertical, hour IX higheſt.	23	24	0,5	62	30,1
	24	25	2,4	62	29,9
	25	26	2,6	63	29,7
	26	27	4,2	59	29,6
	27	28	5,1	58	29,7
	28	29	5,2	57	29,6
	29	30	5,9	58	29,5
	30 to	July 1	6,3	58	29,5
Watch horizontal, face downwards.	July 1 to	2	12,9	57	29,6
	2	3	13,5	56	29,8
	3	4	12,2	58	29,9
	4	5	11,7	60	29,9
	5	6	12,9	61	29,9
Henceforward watch always horizontal, with face upwards.	6	7	16,3	63	29,8
	7	8	16,2	63	29,8
	8	9	16,6	64	29,9

			Watch gains on mean Time per Day.	Mean State of the Thermometer.	Mean State of the Barometer.
			Sec.	Deg.	Inches.
Watch horizontal, with face upwards.	1766, from				
	July 9	to July 10	18,5	64	29,8
	10	11	18,9	63	29,6
	11	12	18,5	62	29,6
	12	13	18,7	61	29,8
	13	14	19,6	63	29,9
	14	15	19,7	63	29,7
	15	16	18,3	62	29,6
	16	17	19,9	61	29,7
	17	18	18,4	63	29,9
	18	19	20,2	66	30,0
	19	20	19,4	65	30,0
	20	21	20,5	64	29,9
	21	22	20,2	63	29,8
	22	23	18,6	61	29,8
	23	24	18,5	60	29,7
	24	25	20,3	61	29,6
	25	26	19,5	61	29,5
	26	27	19,1	60	29,6
	27	28	19,6	60	29,7
	28	29	20,0	59	29,8
	29	30	19,3	59	29,7
	30	31	20,7	61	29,7
	31	to Aug. 1	18,8	61	29,9
	Aug. 1	to 2	18,3	64	29,8
	2	3	18,2	63	29,7
	3	4	16,2	63	29,9
	4	5	17,7	63	30,0
	5	6	16,9	65	30,1
	6	7	13,1	68	30,1
	7	8	12,8	69	30,1
	8	9	12,3	69	30,1
	9	10	13,6	65	30,1
	10	11	13,3	60	30,0
	11	12	12,4	59	30,0
	12	13	10,9	59	30,1
	13	14	9,5	59	30,1

	1766, from	to	Watch gains on Mean Time per Day.	Mean State of the Thermometer.	Mean State of the Barometer.
			Sec.	Deg.	Inches.
Watch horizontal, with face upwards.	Aug. 14	15	9,3	61	29,8
	15	16	9,9	58	29,8
	16	17	10,2	57	29,9
	17	18	10,9	62	30,0
	18	19	10,9	65	30,1
	19	20	10,2	64	30,1
	20	21	10,3	64	30,1
	21	22	11,1	65	29,9
	22	23	11,8	67	29,8
	23	24	11,6	64	29,8
	24	25	12,7	62	29,8
	25	26	11,9	61	30,0
	26	27	10,7	63	30,1
	27	28	10,8	64	30,0
	28	29	11,4	65	29,9
	29	30	11,3	64	29,9
	30	31	11,9	63	30,0
	31	Sept. 1	12,6	61	30,0
	Sept. 1	2	12,1	62	29,9
	2	3	12,8	60	29,9
	3	4	13,4	60	29,9
	4	5	13,7	61	29,8
	5	6	13,5	58	29,9
	6	7	13,6	60	29,8
	7	8	12,7	60	29,5
	8	9	12,6	60	29,7
	9	10	12,3	56	30,1
	10	11	11,6	58	30,0
	11	12	12,0	59	29,8
	12	13	10,6	58	29,6
	13	14	11,1	55	29,7
	14	15	12,1	53	30,1
	15	16	11,8	56	30,2
	16	17	12,1	59	30,2
	17	18	12,8	61	30,2
	18	19	12,4	60	30,1

			Watch gains on Mean Time per Day.	Mean State of the Thermometer.	Mean State of the Barometer.
			Sec.	Deg.	Inches.
	1766, from				
Watch horizontal, with face upwards.	Sept. 19	to 20	11,7	61	30,0
	20	21	11,9	62	30,0
	21	22	13,5	64	30,0
	22	23	11,9	65	30,0
	23	24	12,9	62	30,1
	24	25	12,6	59	30,2
	25	26	11,3	59	30,2
	26	27	11,9	59	30,0
	27	28	11,2	58	29,9
	28	29	11,2	57	29,8
	29	30	11,7	58	29,8
	30	to Oct. 1	10,9	59	29,8
	Oct. 1	to 2	11,0	58	29,8
	2	3	9,9	58	29,8
	3	4	11,8	58	29,7
	4	5	12,5	58	29,5
	5	6	11,8	60	29,3
	6	7	11,5	58	29,3
	7	8	12,6	56	29,4
	8	9	13,2	54	29,5
	9	10	13,0	51	29,8
	10	11	12,4	49	29,9
	11	12	12,7	46	30,0
	12	13	13,4	44	30,0
	13	14	14,4	47	30,0
	14	15	16,0	50	30,1
	15	16	16,4	52	30,2
	16	17	16,3	49	30,4
	17	18	15,9	46	30,4
	18	19	17,0	48	30,2
	19	20	18,8	52	30,1
	20	21	18,5	54	30,0
	21	22	18,8	51	30,0
	22	23	19,2	51	30,0
	23	24	18,4	50	29,8
	24	25	19,5	47	29,8

			Watch gains on Mean Time per Day.	Mean State of the Thermometer.	Mean State of the Barometer.
			Sec.	Deg.	Inches.
	1766, from				
Watch horizontal, with face upwards.	Oct. 25 to	26	21,5	49	29,6
	26	27	20,4	55	29,4
	27	28	21,2	56	29,3
	28	29	20,3	55	29,4
	29	30	21,2	53	29,2
	30	31	20,9	52	29,3
	31 to	Nov. 1	18,3	49	29,9
	Nov. 1 to	2	20,3	49	30,0
	2	3	19,3	49	29,9
	3	4	19,9	50	29,9
	4	5	21,2	49	30,2
	5	6	16,9	45	30,4
	6	7	17,3	44	30,1
	7	8	18,5	43	29,8
	8	9	17,5	43	29,9
	9	10	17,6	42	30,1
	10	11	17,6	44	30,0
	11	12	18,9	45	29,8
	12	13	19,6	48	29,6
	13	14	18,3	47	29,5
	14	15	18,1	45	29,6
	15	16	18,7	45	29,7
	16	17	17,9	47	29,5
	17	18	19,5	50	29,2
	18	19	19,5	52	29,1
	19	20	19,7	52	29,3
	20	21	17,9	51	29,4
	21	22	17,7	50	29,6
	22	23	17,8	48	29,9
	23	24	17,9	48	30,1
	24	25	18,2	51	30,1
	25	26	17,1	48	30,0
	26	27	16,1	43	30,0
	27	28	15,3	41	30,2

			Watch gains on Mean Time per Day.	Mean State of the Thermometer.	Mean State of the Barometer.
			Sec.	Deg.	Inches.
Watch horizontal, with face upwards.	1766, from				
	Nov. 28	to 29	16,6	42	30,3
	29	30	16,4	44	30,2
	30	to Dec. 1	16,5	43	30,1
	Dec. 1	to 2	15,9	43	30,2
	2	3	15,8	43	30,2
	3	4	15,8	41	30,1
	4	5	16,0	40	30,1
	5	6	16,5	40	30,1
	6	7	16,1	41	30,0
	7	8	15,8	41	29,8
	8	9	15,6	40	29,8
	9	10	15,2	40	29,7
	10	11	18,7	43	29,4
	11	12	19,4	46	29,2
	12	13	19,1	45	29,5
	13	14	16,5	42	29,9
	14	15	15,9	43	29,7
	15	16	17,9	42½	29,6
	16	17	15,8	42	29,7
	17	18	17,8	41	29,4
	18	19	15,2	39	29,4
	19	20	15,0	38	29,1
	20	21	16,1	39	28,7
	21	22	11,9	39½	29,1
	22	23	11,4	38	29,7
	23	24	9,2	36	30,1
	24	25	9,3	36	30,2
	25	26	8,6	35	30,3
	26	27	8,0	35	30,3
	27	28	8,0	35	30,4
	28	29	6,8	37	30,4
	29	30	6,1	38	30,3
	30	31	7,6	40	30,2
	31	to Jan. 1 1767	7,5	40	30,1

			Watch gains on Mean Time per Day.	Mean State of the Thermometer.	Mean State of the Barometer.
			Sec.	Deg.	Inches.
	1767, from				
Watch horizontal, with face upwards.	Jan. 1	to Jan. 2	6,3	37	29,7
	2	3	0,8	35	29,4
	3	4	Loſes 2,4	34	29,6
	4	5	Loſes 6,5	31	29,8
	5	6	Loſes 2,7	31	29,7
	6	7	Gains 3,3	32	29,6
	7	8	Gains 5,7	32½	29,5
	8	9	Gains 3,1	31½	29,4
	9	10	Loſes 0,3	28	29,5
	10	11	Loſes 0,8	27	29,4
	11	12	Gains 5,4	30	29,2
	12	13	3,6	29	29,2
	13	14	4,6	31	29,0
	14	15	10,3	34	29,2
	15	16	10,0	34	29,4
	16	17	8,3	32	29,6
	17	18	8,5	31	29,7
	18	19	2,3	29	29,8
	19	20	Loſes 0,1	25½	29,8
	20	21	0,0	26	29,9
	21	22	Gains 5,9	32½	29,8
	22	23	8,9	36	29,5
	23	24	9,7	35	29,8
	24	25	10,6	37	29,8
	25	26	11,3	40	29,7
	26	27	12,9	41½	29,7
	27	28	12,8	44	29,6
	28	29	15,1	44	29,7
	29	30	12,9	43	29,8
	30	31	15,5	45½	29,8
	31	to Feb. 1	16,5	47	29,8
	Feb. 1	to 2	16,0	48	29,9
	2	3	15,5	47	29,9
	3	4	16,1	45	29,8
	4	5	15,4	43	29,7

			Watch gains on Mean Time per Day.	Mean State of the Thermometer.	Mean State of the Barometer.
			Sec.	Deg.	Inches.
	1767, from				
Watch horizontal, with face upwards.	Feb. 5	to Feb. 6	13,3	41	29,6
	6	7	12,7	41	29,5
	7	8	16,4	44	29,2
	8	9	17,2	45	29,2
	9	10	16,6	44	29,2
	10	11	18,7	45	29,3
	11	12	17,8	46	29,1
	12	13	16,0	43	29,1
	13	14	16,0	44	29,2
	14	15	16,7	46	29,3
	15	16	15,1	45	29,6
	16	17	16,7	45	29,5
	17	18	19,8	49	29,4
	18	19	16,2	46	29,7
	19	20	17,1	44	29,7
	20	21	16,4	45	29,4
	21	22	17,6	45	29,4
	22	23	15,7	43	29,6
	23	24	16,8	43	29,8
	24	25	17,6	44	29,8
	25	26	17,4	45	29,6
	26	27	18,8	47	29,4
	27	28	18,1	45	29,4
	28	to Mar. 1	17,5	44	29,7
	March 1	to 2	18,3	45	29,8
	2	3	18,5	44	29,6
	3	4	18,7	44	29,7

From the foregoing numbers it appears, that the watch was getting from the very firſt near 20 ſeconds per day; a circumſtance which it is not my buſineſs to account for; but which, as it kept near mean time in the voyage to Barbadoes, ſeems to ſhew that the watch cannot be taken to pieces and put together again without altering its rate of going conſiderably, contrary to Mr. Harriſon's aſſertions formerly. However, if it had got always uniformly, it might be equally uſeful, and would only give a little more trouble of calculation to the perſon who ſhould make uſe of it.

Previous to the following deductions from the foregoing rates of the watch, it may be proper to premiſe, that a watch deſigned to keep time within 2 minutes in 6 weeks, which I ſhall take as the time of a Weſt India voyage, ought not to be liable to vary its rate of going ſo much as 3 ſeconds per day, at a medium, from what it had kept at land before it was ſent to ſea; for 3 ſeconds per day in 42 days or 6 weeks make 126″ or 2′.6″.

From May 6th to May 17th, 1766, the watch, being in a horizontal poſition, gained at the rate of 19″,5 per day at a medium. From July 6th, when the watch was again placed in a horizontal poſition, till the end of the month, the watch got at the rate of 19″,1 per day at a medium, which is not half a ſecond different from the mean rate of the firſt 11 days of its being at the Obſervatory.

But in the two following months of Auguſt and September, and the firſt half of October, the watch went from from 7 to 10″ in a day ſlower than before; and the mean rate of the watch's gaining in Auguſt was 12″,4, and in September 12″,2 per day, and in the firſt 15 days of October 12″,8 per day: this change began in the beginning of Auguſt, on the few and only hot days we had laſt ſummer, which yet were not extreme, the thermometer within doors having never riſen above 73°; the reſt of the ſummer in general was remarkably cool and temperate. Whether it was the heat of the weather which occaſioned this difference, I know not, for though the heat laſted but a few days, the watch continued, till the middle of October, to go at the ſame rate; viz. from 7 to 10″ per day ſlower than it had gone at firſt. But about the middle of October the watch returned nearly to the ſame rate of going which it had ſhewn at its firſt coming to the Obſervatory; for in the latter half of October it got at the rate of 19″,1 per day at a medium, and in November it got at the rate of 18″,1 per day at a medium; but in the month of December it again went ſlower, the mean rate of its getting for that month being 13″,7; and toward the latter end of the month it went gradually ſlower and ſlower as the weather grew colder, and at laſt got no more than 7″ per day, or went 12″½ per day ſlower than it had done at firſt, though the thermometer, placed in the room near the watch, was never ſo low as freezing in this month. In the month of January of the preſent year, the watch went extremely irregular, having on ſome days even loſt a few ſeconds, though its mean rate in this month was that of gaining 6″,2 per day. Theſe variations and irregularities appear to have been owing to the froſt, the thermometer in the houſe having been ſometimes below 32°, or the point of freezing. The greateſt cold indicated by the thermometer in the houſe was 25° on January 10th this year, on which day the watch loſt near 1 ſecond, or went 20″¼ ſlower than it had done at firſt. But the watch loſt moſt on January 4th; viz. 6″½, or went 26″ per day ſlower than it had gone at firſt; yet the thermometer on this day was but about 1° below freezing. But there does not appear to be any regular connexion between theſe variations of the watch and thoſe of the thermometer, the ſame degree of the thermometer anſwering to very different rates of the watch on different days, to the amount of 15″. However, it ſeems in general that the froſt muſt have been the cauſe of theſe irregularities, as well as of the watch's going ſo much ſlower in the month of January than it had gone before. Thus cold ſeemed to have occaſioned the watch to go ſlower in January, as heat ſeemed to have done in the month of Auguſt.—In the next month, or February, the thermometer in the houſe being always above 40°, the watch got at the rate of 16″,6 per day, or 3″ per day leſs than it had got at firſt coming to the Obſervatory.

The greateſt difference of the rate of the watch, when in a horizontal poſition, on any 2 days from May 7, 1766 to March 4, 1767 is 28″, its greateſt rate of getting having been 21″,5 on October 25, 1766, and its greateſt rate of loſing 6″¼ Jan. 4th laſt.——According to Mr. William Harriſon's account of the watch, given in to the Board of Longitude before he went on the late voyage to Barbadoes, the watch ſhould go 1″ per day faſter for every 10 degrees of the falling of the thermometer, and loſe as much for every 10 degrees of its riſing: but the rate of the going of the watch appears above to be too irregular to bear any analogy to this rule, or to render it expedient to pay any regard thereto in the calculations of the going of the watch, and indeed too irregular to afford grounds for eſtabliſhing any other certain rule for any variations of the watch anſwering to different degrees of the thermometer.

I have not obſerved the going of the watch to be affected by the changes of the air indicated by the barometer.

It may now ſeem proper to take ſome notice of the going of the watch in different poſitions from May the 17th to July 6th, 1766. From May 17th to the 22d, the watch being inclined under an angle of 20° to the horizon, with the hour XII higheſt, got at the rate of 19″,7 per day at a mean; from May 22d to 27th, under the ſame inclination, but with the hour VI higheſt, it got at the rate of 23″,0 per day; from May 27th to June 3d, under the ſame inclination, with the hour III higheſt, it got 12″,4 per day; and from June 3d to 8th, under the ſame inclination, with the hour IX higheſt, it got 14″,0 per day. Now it appears, at firſt ſight, that theſe variations are ſo different with reſpect to one another, and alſo from the going of the watch in a horizontal poſition, that they would be alone ſufficient to deſtroy the regularity of the watch at ſea, however perfectly it might go in the horizontal poſition, in caſe it was liable to be put 20° out of that poſition by the motion of the ſhip. Mr. Harriſon abſolutely condemns the uſe of gimbols to hang the watch in, as what would produce irregular motions in the balance, of worſe conſequence than thoſe they might be intended to correct. On the contrary, he thinks it expedient to fix the box, in which the watch is kept, firmly to ſome ſolid part of the ſhip, ſo that it is neceſſitated to obey the motions of the ſhip; theſe Mr. William

Harriſon reckons in a large ſhip to be conſiderably leſs than 20°; viz. the greateſt rolling of the ſhip 15°, and the greateſt lye-down of the ſhip, when going upon one tack, 12°: the ill effects of the lying down of the ſhip he ſufficiently obviates by altering the poſition of the watch in its box, ſo as to reduce it again to a horizontal poſition as often as the ſhip changes its tack: but he is obliged to ſubmit it to the other motion, that of the rolling of the ſhip. It may be difficult to eſtimate how much this cauſe of error may affect the watch, or how much more in ſome voyages than others; but, from the above-recited variations of the watch, when inclined 20° to the horizon, it is probable the difference may be of conſequence in a voyage of 6 weeks.

The watch was alſo tried in a vertical poſition, with the hours XII, VI, III, and IX upwards ſucceſſively, from June 8th to July 1ſt, and was found to gain 29″,5 per day at a mean in the firſt poſition; to loſe 2″,0 per day in the ſecond poſition; to gain 3″,5 per day in the third poſition; and to gain 4″,0 per day in the 4th poſition. It was alſo found to gain 12″,6 per day in a horizontal poſition with the face downwards, or to go about 7″ per day ſlower than in the horizontal poſition with the face upwards.

It is obvious, that theſe laſt-mentioned trials of the watch in a vertical poſition could not be deſigned to ſhew how near it would go at ſea, where it can never obtain theſe poſitions: the intent of them is to prove how near Mr. Harriſon's execution of his watch comes up to his principles with reſpect to the making all the arcs deſcribed by the balance, whether large or ſmall, to be performed in the ſame time, as Mr. Harriſon aſſerts them to be. The experiments evidently ſhew, that the correction in queſtion is not accurate, but only an approximation, ſince the rate of the watch's gaining with the hours III and IX higheſt is 3 or 4″ per day, or 16″ leſs than in the horizontal poſition; and the mean of the two rates of the watch's gaining with the hours VI and XII higheſt is about 13″½, or 6″ leſs than in the horizontal poſition. My reaſon for taking the mean of the two rates of the watch with the hours VI and XII higheſt is, that Mr. Harriſon makes his balance heavier next the hour XII, in order to correct the error ariſing from the contrary bendings of the thermometer by its weight in theſe two different poſitions.

Hitherto I have only ſhewn the rate of the watch's going from day to day; I ſhall now give an account of its going for a period of time, and ſhall fix upon that of 6 weeks, which is generally reckoned the term of a Weſt India voyage, the only one in which the watch has hitherto been tried.

From May 6, 1766, which was the day after the watch arrived at the Royal Obſervatory, to March 4, 1767, there are 6 periods of 6 weeks each, in which the watch was tried in a horizontal poſition with the face upwards, excluſive of the 20 days in which it was tried in other different poſitions; I ſhall therefore exhibit the gaining of the watch in theſe ſeveral periods, from the compariſon of which with each other it will be eaſy to form a judgment of the probability of the watch's keeping the longitude during the period of a Weſt India voyage.

From the obſerved tranſits of the ſun over the meridian according to the time of the regulator of the Obſervatory, together with the atteſted compariſons of Mr. Harriſon's watch with the ſaid clock, I found the watch to have been too faſt for mean time on ſeveral days as follows;

				H.	M.	S.
1766,	May	6,	——		0.	16,2
		17,	——		3.	51,8
	July	6,	——		14.	14,0
	Auguſt	6,	——		23.	58,4
	September	17,	——		32.	15,6
	October	29,	——		42.	20,9
	December	10,	——		54.	46,8
1767,	January	21,	——	1.	0.	28,6
	March	4,	——	1.	11.	23,0

Hence from May 6th to 17th, 1766, in 11 days, the watch gained 3′. 36″; and from July 6th to Aug. 6th, in 31 days, it gained 9′. 44; therefore,

			′ ″		° ′	
During the firſt 6 weeks of its being at the Obſervatory in the horizontal poſition, — —		it gained	13. 20	anſwering to	3. 20	of longitude.
In the 2d period of 6 weeks,	from Aug. 6 to Sept. 17,	——	8. 17	——	2. 4	
In the 3d period,	from Sept. 17 to Oct. 29,	——	10. 5	——	2. 31	
In the 4th period,	from Oct. 29 to Dec. 10,	——	12. 26	——	3. 6	
In the 5th period,	from Dec. 10 to Jan. 21, 1767,	——	5. 42	——	1. 25	
In the 6th and laſt period,	from Jan. 21 to Mar. 4, 1767,	——	10. 54	——	2. 43	

Hence it appears, that the watch gains in 6 weeks from 5′. 42″ to 13′. 20″, or from 1°. 25′ to 3°. 20′ of longitude, that is to ſay, very differently in the ſeveral periods. It is true, that if it gained equally in every period of 6 weeks, or even in the two periods immediately following each other, it might come to much the ſame thing in careful and diligent hands, as if it did not vary at all: for, as the going of the watch might be aſcertained by aſtronomical obſervations made on ſhore for the ſpace of 6 weeks before it was ſent to ſea, the rate of going ſo found might be allowed in the ſubſequent voyage.

It is evident from the above account, that the watch does not gain alike in the ſeveral periods of 6 weeks; let us then examine how much difference there is of its going in the periods immediately following each other. It will be found therefore, that the watch gains

	′ ″		° ′	
In the 2d period leſs than in the firſt by	5. 3	anſwering to	1. 16	of longitude.
In the 3d period more than in the 2d by	1. 48	———	0, 27	
In the 4th period more than in the 3d by	2, 21	———	0. 35	
In the 5th period leſs than in the 4th by	6. 44	———	1. 41	
In the 6th period more than in the 5th by	5. 12	———	1. 18	

Now it is evident, that of theſe five differences there is only one which is under half a degree, and one between half a degree and 40′; the other three differences are all above a degree: therefore, ſuppoſing Mr. Harriſon's watch went the ſame at ſea as at land, it ſhould ſeem, according to the foregoing compariſons, that the probability of its keeping the longitude in a Weſt India voyage within half a degree was to the probability againſt its doing ſo, only as 1 to 4; and the probability of its coming within 40′, or 2 thirds of a degree, to the probability againſt its doing ſo, as 2 to 3.

But if the 5th period of 6 weeks, during which the thermometer placed in the room near the watch was ſometimes below 32°, or the point of freezing, be excepted from the five others, then the differences of the going of the watch in the other five periods from each other will be 5′. 3″; 1′. 48″; 2′. 21″; and 1′. 34″; which anſwer to 1°. 16′; 0°. 27′; 0°. 35′; and 0°. 23′ of longitude. Of theſe four reſults the 2d and 4th are under half a degree, and the 3d between half a degree and 40′, and only the 4th above a degree.

Therefore it ſhould ſeem to follow from hence, that, in caſe the watch was never expoſed to a degree of cold approaching to freezing, the probabilities are equal for and againſt its keeping the longitude within half a degree in a voyage of ſix weeks; and the probability of its keeping the longitude within 40′, or 2 thirds of a degree, is to the probability of its loſing the longitude above a degree, as 3 to 1.

Theſe conſiderations are ſufficient to explain the motives which might have actuated Mr. Harriſon, as a man of prudence, in deſiring to ſend his watch upon two voyages to the Weſt Indies, upon his idea that he ſhould be intitled to the large rewards preſcribed in the act of the 12th of Queen Anne, in caſe his watch kept time within the limits there mentioned, whether the method itſelf was or could be rendered generally uſeful and practicable, or not.

I have now, as I apprehend, given a ſufficient account of the going of Mr. Harriſon's watch for ten months paſt at the Royal Obſervatory. In concluſion, it may perhaps be expected of me, that I ſhould add ſome general opinion concerning the ſame and its utility, which therefore I ſhall not ſcruple to deliver as follows:

That Mr. Harriſon's watch cannot be depended upon to keep the longitude within a degree in a Weſt India voyage of ſix weeks; nor to keep the longitude within half a degree for more than a fortnight, and then it muſt be kept in a place where the thermometer is always ſome degrees above freezing: that, in caſe the cold amounts to freezing, the watch cannot be depended upon to keep the longitude within half a degree for more than a few days; and perhaps not ſo long, if the cold be very intenſe: nevertheleſs, that it is a uſeful and valuable invention, and, in conjunction with the obſervations of the diſtance of the moon from the ſun and fixed ſtars, may be of conſiderable advantage to navigation.

NEVIL MASKELYNE,
ASTRONOMER ROYAL.

March 13, 1767.

COPY OF THE

RESOLUTIONS of the Board of Longitude,

RELATIVE TO THE TRIAL OF

Mr. HARRISON'S Watch at the Royal Obſervatory.

AT a Meeting of the Commiſſioners appointed by act of Parliament for the diſcovery of the longitude at ſea, &c. which was held at the Admiralty on Saturday the 26th of April 1766, the Board came to the following reſolutions relative to Mr. Harriſon's watch; viz.

That the Lords of the Admiralty be deſired to deliver it into the cuſtody of the Aſtronomer Royal;

That it be kept in the Royal Obſervatory at Greenwich in a box, having two different locks, fixed to the floor or wainſcot, with a plate of glaſs in the lid or ſide of the ſaid box; and that it be compared as often as convenient with the regulator, and the variations ſet down;

That the form which Mr. Harriſon obſerved in winding it up, be exactly followed;

That the Lords of the Admiralty be deſired to give directions, that one of the captains or lieutenants of Greenwich Hoſpital may

attend

attend every day at the Obſervatory, at a ſtated hour, to witneſs the winding up of the ſaid watch and the compariſon of it with the regulator;

That a key of one of the locks be kept at the ſaid Hoſpital for the uſe of thoſe officers, and the other to remain at the Obſervatory for the uſe of the Aſtronomer Royal, or his Aſſiſtant;

That the watch be tried in various poſitions till the beginning of July next, and from thence to the end of February following, in a horizontal poſition with the face upwards;

That the variation of the watch be noted down, and a regiſter of the barometer and thermometer, at the times of comparing the ſame with the regulator, be regularly kept, and atteſted by the Aſtronomer Royal, or his aſſiſtant, and ſuch of the officers abovementioned as ſhall from time to time attend to ſee the ſaid watch wound up and compared as aforeſaid.

A COPY.

JNO. IBBETSON.

CERTIFICATE.

MONDAY, MAY 5th, 1766.

WE, whoſe names are hereunto ſubſcribed, do certify, That we were preſent at the Admiralty when Philip Stephens, Eſq; ſecretary of the Admiralty, delivered Mr. John Harriſon's watch or time-keeper, locked up in a box ſealed with three ſeals, all intire, to the Rev^d. Mr. Nevil Maſkelyne, Aſtronomer Royal; and That we accompanied Mr. Maſkelyne with the watch immediately to Greenwich in Sir George Rodney's barge, and thence to the Royal Obſervatory, and ſaw the ſeals taken off the box in which the watch was locked up, the watch taken out, wound up, and ſet a-going according to mean time computed by Mr. Maſkelyne, at 3 hours 35 minutes p. m. mean time; and That we ſaw a deal box, which has been provided for keeping the watch in, and which is furniſhed with two locks of different wards, ſcrewed down to the ſeat of one of the windows in the room belonging to the tranſit inſtrument, the watch put into the ſaid box in an horizontal poſition with the face upwards, and both locks of the box faſtened by their reſpective keys, being two in number to each lock, and the keys of one of the locks left in the poſſeſſion of Mr. Maſkelyne, and the keys of the other lock delivered to Capt. Thomas Baillie of the Royal Hoſpital of Greenwich, who had been appointed by Sir George Rodney, governor of Greenwich Hoſpital, to attend the conveyance of the watch from the Admiralty to Greenwich, and the fixing it up at the Royal Obſervatory. We then ſaw the watch compared with the regulator ſtanding in the ſame room, and the time ſhewn by each ſet down as follows; the time of the watch 3 hours 57 minutes 0 ſeconds; the time of the clock 6 h. 50 m. 52 ſ.

THO. BAILLIE.
J$^{NO.}$ IBBETSON.
LARCUM KENDALL.

THE ORIGINAL
OBSERVATIONS
OF THE
GOING OF THE WATCH
FROM
DAY TO DAY.

INTRODUCTION.

THE Board of Longitude, held April 26, 1766, having come to a reſolution to have Mr. Harriſon's longitude watch or time-keeper examined at the Royal Obſervatory, under my inſpection, as to the manner of its keeping time, from the beginning of May 1766 to the end of February 1767;

Monday, May 5, 1766, I received it from the hands of Philip Stephens, Eſq; ſecretary of the Admiralty, locked up in a box ſealed with three ſeals, all intire, in the preſence of Captain Thomas Baillie, of the Royal Hoſpital, Greenwich; Mr. John Ibbetſon, ſecretary of the Board of Longitude; and Mr. Larcum Kendal, watch-maker, being one of the ſix perſons that had been appointed by the Board of Longitude to receive the diſcovery of the principles and conſtruction of the ſaid watch laſt year, and who has lately entered into articles with the Board to make a watch after the model of this.

We immediately went on board Sir George Rodney, governor of Greenwich Hoſpital, his barge (which he had been ſo obliging as to offer me the uſe of on this occaſion) at Whitehall ſtairs, which carried us directly to Greenwich; and we walked up, without delay, to the Royal Obſervatory. Where being arrived, I cauſed a deal box, that had been provided, agreeable to the reſolutions of a late Board of Longitude, with two locks of different wards, and two keys to each lock, and a glaſs in the lid, and another in the ſide, both ſecured with putty, ſealed with the ſeal of Philip Stephens, Eſq; ſecretary of the Admiralty; I ſay, I cauſed the ſaid deal box to be ſcrewed down firmly, by ſcrews paſſing through the bottom to the ſeat of one of the windows of the room belonging to the tranſit inſtrument. I took the ſeals off the box in which the watch was locked up, took out the watch, and delivered it to Mr. Kendal, who was pleaſed to offer his ſervice to wind up the watch according to Mr. Harriſon's method, to ſet the hour and minute hands to agree with the ſecond hand, and a little before mean time computed by myſelf, and to put the balance in motion, upon my calling out at 3 h. 35 m. p. m. mean time, all in the preſence of Captain Baillie, Mr. Ibbetſon, and myſelf. Mr. Kendal having done this, laid the watch in the deal box above-mentioned, in a horizontal poſition, with the face upwards, and Captain Baillie and myſelf faſtened each his lock of the deal box with his reſpective key. The two keys of one lock remained with myſelf, and the two keys of the other lock with Captain Baillie, for the uſe of the officers of Greenwich Hoſpital, in order that they may aſſiſt in unlocking the deal box, containing the watch, at a ſtated hour every day, when it is to be wound up, compared with the regulator of the Obſervatory, and locked up again in their preſence. I then compared the watch with the regulator of the Obſervatory or tranſit clock, in the preſence, as every thing elſe had been done, of the three gentlemen above-mentioned; and the time ſhewn by the watch being 3 h. 57 m. 0 ſ. p. m. the time ſhewn by the tranſit clock was 6 h. 50 m. 52 ſ.

N. B. The time ſhewn by the watch is mean time nearly, and and the time ſhewn by the clock, is ſidereal time nearly, or correſponds nearly with the right aſcenſion of that point of the equator, which is upon the meridian.

Here follow the compariſons of Mr. Harriſon's watch with the regulator or tranſit clock of the Royal Obſervatory: where the firſt column contains the day of the month, the ſecond the time by the watch, the third the time by the clock; the fourth the height of the barometer, and the fifth the height of the thermometer at the time.

The compariſons of the watch with the clock, ſtanding immediately againſt the day of the month, are thoſe which were made in the preſence of, and atteſted by, the officers of Greenwich Hoſpital.

The form of the certificate made uſe of on this occaſion, was as follows:

" We hereby certify, That we aſſiſted in unlocking the box, in
" which Mr. Harriſon's watch is kept, ſaw it wound up, locked up
" again, and compared with the regulator of the Obſervatory; and

" the time ſhewn by each, and the height of the barometer and
" thermometer, ſet down as follows:

" Sunday, May 11, 1766, Time by the watch 0 h. 9 m. 0 ſ.
" Time by the regulator 3 h. 23 m. 57 ſ. The height of the barometer being 29,57 inches, and that of the thermometer 53 degrees. The watch is left in an horizontal poſition, with the
" face upwards."

N. B. The compariſons made by my aſſiſtant Joſeph Dymond, and afterwards William Bayly, are ſigned with the initials of their names reſpectively, as is alſo the winding up of the watch, when performed by them.

Note alſo, That the time of the watch is ſet down in the aſtronomical manner, the day being ſuppoſed to begin at noon, and the hours of the watch being counted up to 24 hours, or the ſucceeding noon.

NEVIL MASKELYNE,
ASTRONOMER ROYAL.

COMPARISONS of Mr. HARRISON's Watch with the Tranſit Clock of the ROYAL OBSERVATORY.

	Time per Watch.	Time per Clock.	Baro-meter.	Ther-mo-meter.	
1766.	H. M. S.	H. M. S.	Inches.	Deg.	
☽ May 5.	3. 35. 0	– –	–	–	The watch was wound up by Mr. Larcum Kendal, and ſet a going by him, nearly with mean time, and locked up in its box in a horizontal poſition, with the face upwards.
	3. 57. 0	6. 50. 52			
	6. 34. 30	9. 28. 46			
	6. 35. 10	9. 29. 26	29,59	54	
	6. 53. 41	9. 48. 0			
	6. 54. 30	9. 48. 49			
	8. 45. 0	11. 39. 36			
	8. 46. 0	11. 40. 36	29,67	53	
	8. 52. 0	11. 46. 37			
	8. 56. 22½	11. 51. 0			
	8. 59. 0	11. 53. 38			
	9. 2. 0	11. 56. 38½			
	9. 6. 0	12. 0. 39			
	9. 12. 0	12. 6. 40			
	9. 19. 0	12. 13. 41			
	9. 25. 0	12. 19. 42			
	9. 26. 0	12. 20. 42			
	9. 32. 0	12. 26. 43			J. Dymond.
	10. 25. 0	13. 19. 51	29,71	52	
	11. 17. 0	14. 11. 59	29,73	51	
	16. 47. 0	19. 42. 49	29,85	49	
	17. 12. 0	20. 7. 53			
	17. 46. 0	20. 41. 58	29,85	49	
	18. 5. 0	21. 1. 1	29,86	49	
	20. 31. 0	23. 27. 23	29,93	49½	
♂ 6	– –	– –	–	–	I wound up the watch, and left it horizontal, with the face upwards.
	0. 42. 0	3. 39. 1	29,96	54½	
	2. 54. 0	5. 51. 21	29,95	54½	
	4. 33. 0	7. 30. 36	29,95	54	
	6. 59. 0	9. 56. 58	29,91	55	
	7. 11. 0	10. 9. 0			
	7. 12. 0	10. 10. 0		55	
	7. 18. 0	10. 16. 1			
	8. 37. 0	11. 35. 13			
	8. 38. 0	11. 36. 13	29,89	55	
	10. 24. 0	13. 22. 29	29,88	54	
	10. 31. 0	13. 29. 30			
	11. 57. 0	14. 55. 43	29,86	53½	
	20. 13. 0	23. 12. 58	29,84	54	
	21. 59. 0	0. 59. 14	29,83	54½	

COMPARISONS of Mr. HARRISON's Watch with the Tranſit Clock of the ROYAL OBSERVATORY.

		Time per Watch.	Time per Clock.	Barometer.	Thermometer.	
	1766.	H. M. S.	H. M. S.	Inches.	Deg.	
☿	May 7.	– –	– –	–	–	I wound up the watch, and left it horizontal, with the face upwards.
		0. 12. 0	3. 12. 34	29,80	56	
		3. 17. 0	6. 18. 2	29,75	58½	
		4. 31. 0	7. 32. 13	29,74	59	
		7. 31. 0	10. 32. 40	29,71	58	
		8. 43. 0	11. 44. 51	29,70	57½	
		10. 16. 0	13. 18. 5	29,70	57	
		11. 10. 0	14. 12. 13	29,69	56½	
		20. 56. 0	11. 59. 41			
♃	8.	– –	– –	–	–	I wound up the watch, and left it horizontal, with the face upwards.
		0. 16. 0	3. 20. 11	29,50	55½	
		4. 17. 0	7. 21. 47	29,49	56½	
		6. 17. 0	9. 22. 5	29,49	57	
		6. 57. 0	10. 2. 11			
		6. 58. 0	10. 3. 11	29,50	57	
		8. 38. 0	11. 43. 26	29,50	55½	
		10. 11. 0	13. 16. 40	29,50	55	
		20. 32. 0	23. 39. 13	29.64	52½	
♀	9.	– –	– –	–	–	I wound up the watch, and left it horizontal, with the face upwards.
		0. 8. 0	3. 15. 45	29,64	55	
		4. 28. 0	7. 36. 24	29,55	56	J. Dymond.
		4 34. 0	7. 42. 25			
		4. 40. 0	7. 48. 26			
		9. 49. 0	12. 58. 12	29,30	54½	
		9. 56. 0	13. 5. 13			
		10. 3. 0	13. 12. 14			
		10. 9. 0	13. 18. 15			
		10. 16. 0	13. 25. 16			
		20. 57. 0	0. 7. 52	29,23	52½	
		21. 4. 0	0. 14. 53			
		21. 11. 0	0. 21. 54			
♄	10.	– –	– –	–	–	Wound up watch, and left it horizontal, with face upwards. J. Dymond.
		0. 12. 0	3. 23. 21	29,40	50½	J. Dymond.
		0. 39. 0	3. 50. 25			
		0. 40. 0	3. 51. 25	29,41	51	
		4. 20. 0	7. 31. 58	29,51	50½	
		8. 27. 0	11. 39. 35			
		8. 28. 0	11. 40. 35	29,57	50	
		10. 8. 0	13. 20. 50	29,57	49	
		10. 54. 0	14. 6. 57			

COMPARISONS of Mr. HARRISON's Watch with the Tranſit Clock of the ROYAL OBSERVATORY.

1766.	Time per Watch. H. M. S.	Time per Clock. H. M. S.	Baro-meter. Inches.	Ther-mo-meter. Deg.	
♄ May 10.	10. 55. 0	14. 7. 57	29,57	48	
	11. 27. 0	14. 40. 2			
	11. 28. 0	14. 41. 2	29,58	47	
☉ 11.	– –	– –	-	-	I wound up the watch, and left it horizontal, with the face upwards.
	0. 9. 0	3. 23. 57	29,57	53	
	4. 18. 0	7. 33. 34	29,55	53	
	9. 59. 0	13. 15. 25	29,55	51	
	10. 52. 0	14. 8. 33	29,55	50½	
	11. 26. 0	14. 42. 38	29,55	50	
	16. 25. 0	19. 42. 23			J. Dymond.
	16. 31. 0	19. 48. 24	29,55	48½	
	16. 45. 0	20. 2. 26	29,53	48	
	16. 52. 0	20. 9. 27			
☽ 12.	– –	– –	-	-	I wound up the watch, and left it horizontal, with face upwards.
	0. 10. 0	3. 28. 33	29,57	52	
	4. 17. 0	7. 36. 10	29,57	53½	
	11. 53. 0	15. 13. 18	29,64	51	J. Dymond.
	18. 12. 0	21. 33. 15	29,66	48	
♂ 13.	– –	– –	-	-	I wound up the watch, and left it horizontal, with face upwards.
	0. 19. 0	3. 41. 10	29,61	52	
	10. 48. 0	14. 11. 44	29,72	50	J. Dymond.
	11. 15. 0	14. 38. 48	29,72	50	
☿ 14.	– –	- -	-	-	I wound up the watch, and left it horizontal, with face upwards.
	0. 7. 0	3. 32. 43			
	0. 8. 0	3. 33. 43	29,97	53	
	4. 7. 0	7. 33. 19			
	4. 8. 0	7. 34. 19	30,01	54½	
	6. 35. 0	10. 1. 41	30,02	54½	
	8. 15. 0	11. 41. 56	30,05	54	
	9. 48. 0	13. 15. 10			
	9. 49. 0	13. 16. 10	30,07	53	
	10. 42. 0	14. 9. 18	30,07	53	
	11. 15. 0	14. 42. 23	30,07	53	
	18. 16. 0	21. 44. 26	30,13	50	J. Dymond.
♃ 15.	– –	- -	-	-	J. Dymond wound up the watch in my preſence, and left it in a horizontal poſition, with the face upwards.
	0. 16. 0	3. 45. 20	30,18	55	
	9. 49. 0	13. 19. 46			
	9. 50. 0	13. 20. 46	30,18	56	

COMPARISONS of Mr. HARRISON's Watch with the Tranſit Clock of the ROYAL OBSERVATORY.

	Time per Watch.	Time per Clock.	Barometer.	Thermometer.	
1766.	H. M. S.	H. M. S.	Inches	Deg.	
♃ May 15.	10. 36. 0	14. 6. 53			
	10. 37. 0	14. 7. 53		56	
	11. 10. 0	14. 40. 58	30,18	55½	
	18. 11. 0	21. 43. 1	30,18	52	J. Dymond.
	21. 52. 0	1. 24. 34			
	21. 53. 0	1. 25. 34	30,18	56	
♀ 16.	- -	- -	-	-	Wound up the watch, and left it horizontal, with the face upwards. J. Dymond.
	0. 18. 0	3. 50. 56	30,17	57½	J. Dymond.
	4. 4. 0	7. 37. 30	30,16	58½	
	8. 15. 0	11. 49. 8	30,14	58	
	9. 49. 0	13. 23. 22	30,14	57½	
	10. 35. 0	14. 9. 29			
	10. 36. 0	14. 10. 29	30,14	57	
	11. 15. 0	14. 49. 35	30,14	57	
	19. 7. 0	22. 42. 46	30,11	54	J. Dymond.
	19. 52. 0	23. 27. 53			
	19. 53. 0	23. 28. 53	30,11	55	
♄ 17.	- -	- -	-	-	Wound up the watch, and left it inclined under an angle of 20° to the horizon, with the face upwards, and hour XII higheſt.
	0. 27. 0	4. 3. 34	30,08	59	
	3. 0. 0	6. 36. 57	50,04	60	
	6. 27. 0	10. 4. 28	30,00	59½	J. Dymond.
	8. 7. 0	11. 44. 43	30,00	59	
	9. 41. 0	13. 18. 57	29,99	58	
	11. 7. 0	14. 45. 10			
	11. 8. 0	14. 46. 10	29,99	57½	
	18. 21. 0	22. 0. 15	29,90	54½	J. Dymond.
☉ 18.	- -	- -	-	-	Wound up the watch, and left it inclined under an angle of 20° to the horizon, with the face upwards, and hour XII higheſt.
	0. 13. 0+	3. 53. 8		59	
	0. 14. 0	3. 54. 8	29,85	59	
	10. 56. 0	14. 37. 44	29,84	59	
	19. 37. 0	22. 20. 2	29,89	52	J. Dymond.
☽ 19.	- -	- -	-	-	Wound up the watch, and left it inclined under an angle of 20° to the horizon, with the face upwards, and hour XII higheſt.
	0. 10. 0	3. 53. 43	29,89	51½	
	10. 15. 0	14. 0. 14	29,92	48	J. Dymond.
	20. 50. 0	0. 36. 50	29,90	47½	

COMPARISONS of Mr. HARRISON's Watch with the Tranſit Clock of the ROYAL OBSERVATORY.

	Time per Watch.	Time per Clock.	Barometer.	Thermometer.	
1766.	H. M. S.	H. M. S.	Inches.	Deg.	
♂ May 20.	- -	- -	-	-	Wound up the watch, and left it inclined under an angle of 20° to the horizon, with the face upwards, and the hour XII higheſt.
	0. 35. 0	4. 22. 24	29,95	49	
	8. 31. 0	12. 19. 35	29,95	49½	J. Dymond.
	21. 26. 0	0. 16. 33	29,98	51	
☿ 21.	- -	- -	-	-	Wound up the watch, and left it inclined under an angle of 20° to the horizon, with the face upwards, and hour XII. higheſt. J. Dymond.
	0. 40. 0	4. 31. 2	30,07	54	J. Dymond.
	9. 28. 0	13. 20. 21	30,08	53	
	20. 4. 0	23. 57. 56	30,05	49	J. Dymond.
♃ 22.	- -	- -	-	-	Wound up the watch, and left it inclined under an angle of 20° to the horizon, with the face upwards, and hour VI higheſt.
	0. 13. 0	4. 7. 33	30,03	53½	
	20. 31. 0	0. 28. 31	29,86	52	J. Dymond.
♀ 23.	- -	- -	-	-	Wound up the watch, and left it inclined under an angle of 20° to the horizon, with the face upwards, and hour VI higheſt. J. D.
	0. 48. 0	4. 46. 9	29,81	56	J. Dymond.
♄ 24.	- -	- -	-		Wound up the watch, and left it inclined under an angle of 20° to the horizon, with the face upwards, and hour VI higheſt. J. D.
	0. 21. 0	4. 22. 37	29,74	53½	J. Dymond.
☉ 25.	- -	- -	-	-	Wound up the watch, and left it inclined under an angle of 20° to the horizon, with the face upwards, and hour VI higheſt. J. D.
	0. 45. 0	4. 50. 15	29,69	55½	J. Dymond.
	19. 16. 0	23. 24. 2	29,72	54	
☽ 26.	- -	- -	-	-	Wound up the watch, and left it inclined under an angle of 20° to the horizon, with face upwards, and hour VI higheſt.
	0. 14. 0	4. 22. 47	29,74	56½	
	5. 9. 0	9. 18. 30	29,74	57	
	11. 27. 0	15. 37. 25	29,76	55	
	15. 42. 0	19. 53. 2	29,74	53	
	21. 13. 0	1. 24. 50	29,72	54	J. Dymond.
♂ 27.	- -	- -	-	-	Wound up the watch, and left it inclined under an angle of 20° to the horizon, with face upwards, and hour III higheſt.
	0. 16. 0	4. 28. 17	29,69	56½	
	21. 7. 0	13. 22. 31	29,62	32½	J. Dymond.

COMPARISONS of Mr. HARRISON's Watch with the Tranſit Clock of the ROYAL OBSERVATORY.

	Time per Watch.	Time per Clock.	Barometer.	Thermometer.	
1766.	H. M. S.	H. M. S.	Inches.	Deg.	
☿ May 28.	- -	- -	-	-	Wound up the watch, and left it inclined under an angle of 20°. to the horizon, with the face upwards, and hour III higheſt.
	0. 47. 0	5. 3. 5	29,61	52½	J. Dymond.
	22. 0. 0			49	
♃ 29.	- -	- -	-	-	Wound up the watch, and left it inclined under an angle of 20° to the horizon, with face upwards, and hour III higheſt.
	0. 41. 0	5. 0. 49	29,41	50	
	4. 46. 0	9. 6. 27	29,36	51	J. Dymond.
	20. 50. 0	1. 12. 55	29,38	53½	J. Dymond.
♀ 30.	- -	- -	-	-	Wound up the watch, and left it inclined under an angle of 20° to the horizon, with the face upwards, and hour III higheſt. J. D.
	1. 3. 0	5. 26. 34	29,40	56	J. Dymond.
	5. 49. 0	10. 13. 19	29,40	57	J. Dymond.
	20. 26. 0	0. 52. 36	29,44	52½	J. Dymond.
♄ 31.	- -	- -	-	-	Wound up the watch, and left it inclined under an angle of 20° to the horizon, with face upwards, and hour III higheſt.
	0. 15. 0	4. 42. 12	29,47	53	
	20. 20. 0	0. 50. 19	29,82	50	J. Dymond.
☉ June 1.	- -	- -	-	-	Wound up the watch, and left it inclined under an angle of 20° to the horizon, with the face upwards, and hour III higheſt.
	0. 19. 0	4. 49. 56	29,90	51	
	10. 14. 0	14. 46. 28	29,99	52	
					Stopped tranſit clock, raiſed bob of pendulum $\frac{1}{18}$ of a diviſion, and ſet it going again exactly 27 ſeconds faſter than before.
	10. 39. 0	15. 11. 59	29,99	52	
	18. 29. 0	23. 3. 12	29,99	48½	
☽ 2.	- -	- -	-	-	Wound up the watch, and left it inclined under an angle of 20° to the horizon, with the face upwards, and hour III higheſt.
	0. 30. 0	5. 5. 8	29,94	54	
	5. 20. 0		29,88	55½	
	20. 4. 0	0. 42. 11	29,74	54	J. Dymond.
♂ 3.	- -	- -	-	-	Wound up the watch, and left it inclined under an angle of 20° to the horizon, with face upwards, and hour IX higheſt.
	0. 23. 0	5. 1. 51	29,74	56	
	4. 47. 0	9. 19. 31	29,72	57½	J. Dymond.
	20. 15. 0	0. 56. 55	29,61	57	J. Dymond.

COMPARISONS of Mr. HARRISON's Watch with the Tranſit Clock of the ROYAL OBSERVATORY.

		Time per Watch.	Time per Clock.	Barometer.	Thermometer.	
1766.		H. M. S.	H. M. S.	Inches.	Deg.	
☿	June 4.	- -	- -	-	-	Wound up the watch, and left it inclined under an angle of 20° to the horizon, with face upwards, and hour IX higheſt.
		0. 21. 0	5. 3. 33	29,58	58	
		20. 9. 0	0. 54. 37	29,67	56½	J. Dymond.
♃	5.	- -	- -	-	-	Wound up the watch, and left it inclined under an angle of 20° to the horizon, with face upwards, and hour IX higheſt.
		0. 15. 0	5. 1. 15	29,67	58½	
		20. 14. 0	1. 3. 20	29,70	57	J. Dymond.
♀	6.	- -	- -	-	-	Wound up the watch, and left it inclined under an angle of 20° to the horizon, with face upwards, and hour IX higheſt.
		0. 32. 0	5. 22. 0	29,68	59	J. Dymond.
		20. 5. 0	0. 58. 4	29,76	59	J. Dymond.
♄	7.	- -	- -	-	-	Wound up the watch, and left it inclined under an angle of 20° to the horizon, with face upwards, and hour IX higheſt.
		0. 26. 0	5. 19. 45	29,78	61	
		20. 25. 0	1. 21. 50	29,88	60	
☉	8.	- -	- -	-	-	Wound up the watch, and left it in a vertical poſition, with the hour of XII higheſt.
		0. 18. 0	5. 15. 26	29,88	62	
		5. 36. 0	10. 33. 12	29,87	64½	J. Dymond.
		8. 24. 0	13. 22. 36	29,87	63½	
		20. 52. 0	1. 52. 24	29,86	60½	J. Dymond.
☽	9.	- -	- -	-	-	Wound up the watch, and left it in a vertical poſition, with the hour XII higheſt.
		0. 24. 0	5. 24. 54	29,87	63	
		4. 55. 0	9. 51. 33	29,87	64	J. Dymond.
		20. 24. 0	1. 27. 47	30,01	58½	J. Dymond.
♂	10.	- -	- -	-	-	Wound up the watch, and left it in a vertical poſition, with the hour XII higheſt.
		0. 50. 0	5. 54. 25	30,01	62	J. Dymond.
		3. 55. 0	8. 59. 52	29,98	63½	J. Dymond.
		20. 12. 0	1. 19. 13	29,78	59½	J. Dymond.
☿	11.	- -	- -	-	-	Wound up the watch, and left it in a vertical poſition, with the hour XII higheſt.
		0. 16. 0	5. 23. 48	29,76	61	
		20. 20. 0	1. 30. 42	29,68	58½	J. Dymond.
♃	12.	- -	- -	-	-	Wound up the watch, and left it in a vertical poſition, with hour XII higheſt.
		0. 29. 0	5. 40. 18	29,64	60	
		20. 19. 0	1. 33. 10	29,86	56	J. Dymond.

COMPARISONS of Mr. HARRISON's Watch with the Tranſit Clock of the ROYAL OBSERVATORY.

1766.	Time per Watch. H. M. S.	Time per Clock. H. M. S.	Barometer. Inches.	Thermometer. Deg.	
♀ June 13.	- -	- -	-	-	Wound up the watch, and left it in a vertical poſition, with hour VI higheſt.
	0. 22. 0	5. 36. 45	29,87	60	
	18. 0. 0		29,60		High wind. J. D.
	20. 0. 0		29,58		High wind.
♄ 14.	- -	- -	-	-	Wound up watch, and left it in a vertical poſition, with hour VI higheſt.
	0. 33. 0	5. 51. 47	29,68	59	Wind lower, but ſtill a briſk gale. There has been a high wind ſince five in the morning. About four in the morning there was a good deal of thunder and lightning, as I have been credibly informed.
	4. 15. 0	9. 34. 24	29,77	59½	
	20. 6. 0	1. 28. 2	29,83	56	J. Dymond.
☉ 15.	- -	- -	-	-	Wound up watch, and left it in a vertical poſition, with hour VI higheſt.
	0. 13. 0	5. 35. 43	29,80	57	
	4. 43. 0	10. 6. 28	29,76	58	
	20. 20. 0	1. 46. 4	29,68	56½	J. Dymond.
☽ 16.	- -	- -	-	-	Wound up watch, and left it in a vertical poſition, with hour VI higheſt.
	0. 21. 0	5. 47. 44	29,66	58	
	20. 17. 0	1. 47. 3	29,45	57	J. Dymond.
♂ 17.	- -	- -	-	-	Wound up the watch, and left it in a vertical poſition, with the hour VI higheſt.
	0. 32. 0	6. 2. 45	29,45	59½	J. Dymond.
	20. 11 0	1. 45. 2	29,45	55½	J. Dymond.
☿ 18.	- -	- -	-	-	Wound up the watch, and left it vertical, with the hour III higheſt.
	0. 31. 0	6. 5. 45	29,50	57½	J. Dymond.
	20. 33. 0	2. 11. 0	29,73	55	J. Dymond.
♃ 19.	- -	- -	-	-	Wound up the watch, and left it vertical, with the hour III higheſt.
	0. 33. 0	6. 11. 39	29,74	56	
	20. 17. 0	1. 58. 50	29,89	54	J. Dymond.
♀ 20.	- -	- -	-	-	Wound up the watch, and left it vertical, with the hour III higheſt.
	0. 50. 0	6. 32. 34	29,92	58	J. Dymond.
♄ 21.	- -	- -	-	-	Wound up the watch, and left it in a vertical poſition, with the hour III higheſt.
	0. 51. 0	6. 37. 30	29,99	60	J. Dymond.
	20. 5. 0	1. 54. 38	30,11	63	J. Dymond.

COMPARISONS of Mr. HARRISON's Watch with the Tranſit Clock of the ROYAL OBSERVATORY.

	Time per Watch.	Time per Clock.	Barometer.	Thermometer.	
1766.	H. M. S.	H. M. S.	Inches.	Deg.	
☉ June 22.	– –	– –	–	–	Wound up the watch, and left it in a vertical poſition, with the hour III higheſt.
	0. 53. 0	6. 43. 25	30,13	63½	J. Dymond.
	20. 25. 0	2. 18. 35	30,21	62	J. Dymond.
☽ 23.	– –	– –	–	–	Wound up the watch, and left it in a vertical poſition, with the hour IX higheſt.
	0. 25. 0	6. 19. 14	30,21	65	
	20. 40. 0	2. 37. 34	30,10	62	J. Dymond.
♂ 24.	– –	– –	–	–	Wound up the watch, and left it in a vertical poſition, with the hour IX higheſt.
	0. 25. 0	6. 23. 11	30,05	66	J. Dymond.
	20. 13. 0	2. 14. 25	29,83	62	J. Dymond.
☿ 25.	– –	– –	–	–	Wound up the watch, and left it in a vertical poſition, with the hour IX higheſt.
	0. 30. 0	6. 32. 7	29,77	66	
	20. 30. 0	2. 35. 23	29,55	61	J. D.
♃ 26.	- -	- -	-	-	Wound up the watch, and left it in a vertical poſition, with the hour IX higheſt.
	0. 24. 0	6. 30. 1	29,58	62	
	21. 16. 0	3. 25. 24	29,67	58	
♀ 27.	- -	- -	-	-	Wound up the watch and left it in a vertical poſition with the hour IX higheſt.
	0. 40. 0	6. 49. 57	29,70	60	
♄ 28.	- -	- -	-	-	Wound up the watch, and left it in a vertical poſition, with the hour IX higheſt.
	0. 31. 0	6. 44. 48	29,70	60	
	20. 40. 0	2. 57. 3	29,60	57	J. Dymond.
☉ 29.	- -	- -	-	-	Wound up the watch, and left it in a vertical poſition, with the hour IX higheſt.
	0. 23. 0	6. 40. 39	29,58	58½	
	6. 35. 0	12. 53. 39	29,50	60	
	20. 22. 0	2. 42. 47	29,44	58	J. Dymond.
☽ 30.	- -	- -	-	-	Wound up the watch, and left it in a vertical poſition, with the hour IX higheſt.
	0. 24. 0	6. 45. 31	29,45	59	
	20. 42. 0	3. 6. 47	29,55	57½	J. Dymond.
♂ July 1	- -	- -	-	-	Wound up the watch, and left it in a horizontal poſition, with face downwards.
	0. 33. 0	6. 58. 24	29,58	60	
☿ 2.	- -	- -	-	-	Wound up the watch, and left it in a horizontal poſition, with the face downwards.
	0. 14. 0	6. 43. 6	29,67	58	

COMPARISONS of Mr. HARRISON's Watch with the Tranſit Clock of the ROYAL OBSERVATORY.

		Time per Watch.	Time per Clock.	Barometer.	Thermometer.	
1766.		H. M. S.	H. M. S.	Inches.	Deg.	
♃	July 3.	- -	— —	—	—	Wound up the watch, and left it in a horizontal poſition, with the face downwards.
		0. 30. 0	7. 2. 53	29,89	58	
♀	4.	- -	— —	—	—	Wound up the watch, and left it in a horizontal poſition, with face downwards.
		0. 50. 0	7. 26. 42	29,95	62	J. D.
♄	5.	- -	— —	-	-	Wound up the watch, and left it in a horizontal poſition, with face downwards.
		0. 29. 0	7. 9. 25	29,94	63	
☉	6.	- -	- -	-	-	Wound up the watch, and left it in a horizontal poſition, with the face upwards, ſo to remain till the latter end of February next.
		0. 29. 0	7. 13. 10	29,80	64	
		6. 45. 0	13. 30. 8	29,75	64	
		12. 55. 0	19. 41. 5	29,75	62	
		20. 16. 0	3. 3. 13	29,77	61	J. D.
☽	7.	0. 30. 0	7. 17. 52	29,77	64	
		20. 18. 0	3. 8. 55	29,89	62	J. D.
♂	8.	0. 29. 0	7. 20. 34	29,90	64½	
		20. 36. 0	3. 30. 40	29,91	63	J. D.
☿	9.	0. 37. 0	7. 32. 17	29,91	66	
		21. 18. 0	4. 16. 27	29,78	63½	
♃	10.	0. 37. 0	7. 35. 57	29,71	65½	
		20. 51. 0	3. 53. 2	29,57	63	
♀	11.	0. 27. 0	7. 29. 35	29,36	62½	
		20. 45. 0	3. 50. 41	29,59	61½	J. D.
♄	12.	0. 27. 0	7. 33. 15	29,66	63	
		21. 0. 0			61	
☉	13.	0. 54. 0	8. 3. 59	29,88	64	J. D.
		20. 42. 0	3. 55. 0	29,87	63	J. D.
☽	14.	0. 33. 0	7. 46. 35	29,85	65	
		20. 29. 0	3. 45. 37	29,61	62½	J. D.
♂	15.	0. 25. 0	7. 42. 13	29,61	64	
		20. 47. 0	4. 7. 20	29,64	62	J. D.
☿	16.	0. 54. 0	8. 14. 58	29,64	64	J. D.
		20. 37. 0	4. 0. 58	29,86	61	J. D.
♃	17.	0. 34. 0	7. 58. 34	29,88	63½	
		20. 35. 0	4. 2. 38	29,94	63½	J. D.
♀	18.	0. 30. 0	7. 58. 14	29,95	66	
		20. 30. 0	4. 1. 17	30,00	65½	J. D.
♄	19.	0. 30. 0	8. 1. 53	30,00	67	
		20. 23. 0	3. 57. 55	29,98	64½	J. D.
☉	20.	0. 32. 0	8. 7. 33	29,98	67	At 20½ h. therm. 63°.
☽	21.	0. 28. 0	8. 7. 11	29,81	65¾	

COMPARISONS of Mr. HARRISON's Watch with the Tranſit Clock of the ROYAL OBSERVATORY.

	Time per Watch.	Time per Clock.	Barometer.	Thermometer	
1766.	H. M. S.	H. M. S.	Inches.	Deg.	
☽ July 21.	20. 38. 0	4. 20. 15	29,79	62½	J. D.
♂ 22.	0. 35. 0	8. 17. 51	29,78	64½	At 20 h. 10 m. therm. at 60½°.
☿ 23.	0. 31. 0	8. 17. 31	29,79	63½	At 20 h. 14 m. therm. at 59½.
♃ 24.	0. 33. 0	8. 23. 12	29,58	60	At 20 h. 30 m. therm. at 61.
♀ 25.	0. 33. 0	8. 26. 51	29,58	63	At 20 h. 39 m. therm. at 61.
♄ 26.	0. 28. 0	8. 25. 30	29,50	62½	At 20 h. 29 m. therm. at 59½.
☉ 27.	0. 33. 0	8. 34. 11	29,68	61½	At 21 h. 10 m. therm. at 60.
☽ 28.	0. 47. 0	8. 51. 53	29,84	61½	At 20 h. 55 m. therm. at 59.
♂ 29.	0. 51. 0	8. 59. 33	29,77	61	
☿ 30.	1. 3. 0	9. 15. 15	29,63	59½	J. D. At 20 h. 41 m. therm. at 60½.
♃ 31.	0. 57. 0	9. 12. 53	29,79	63	At 20 h. 20 m. 20. m. therm. at 61.
♀ Auguſt 1.	0. 51. 0	9. 10. 33	29,94	64	
♄ 2.	0. 54. 0	9. 17. 15	29,71	65½	At 20 h. 15 m. therm. at 63.
At	21. 45. 15	- -	-	-	Set tranſit clock to 6 h. 10′ m. having firſt lowered the bob of the pendulum 3½ diviſions.
	22. 27. 0	6. 51. 51	29,79	64	
☉ 3.	0. 54. 0	9. 19. 13	29,81	65½	At 20 h. 49 m. therm. at 62½.
☽ 4.	0. 44. 0	9. 12. 51	29,97	65	J. D. At 20 h. 15′ therm. at 62½.
♂ 5.	1. 5. 0	9. 37. 32	30,11	66½	J. D. At 21 h. 7′ therm. at 65.
☿ 6.	0. 41. 0	9. 17. 7	30,15	68	
♃ 7.	0. 46. 0	9. 25. 50	30,15	70	
♀ 8.	0. 39. 0	9. 22. 31	30,15	71	At 21 h. therm at 69.
♄ 9.	0. 36. 0	9. 23. 13	30,14	71	At 20 h. 40 m. therm. at 64½.
☉ 10.	0. 40. 0	9. 30. 55	30,10	65½	At 20 h. 22 m. therm. at 59.
☽ 11.	0. 35. 0	9. 9. 36	30,01	61½	At 20 h. 37 m. therm. 58½.
♂ 12.	0. 37. 0	9. 35. 19	30,04	62	At 20 h. 37 m. therm. 58½.
☿ 13.	0. 35. 0	9. 37. 3	30,16	61	At 21 h. 0 m. therm. 59.
♃ 14.	0. 55. 0	10. 0. 52	29,97	62	At 20 h. 50 m. therm. 60½.
♀ 15.	0. 35. 0	9. 44. 35	29,74	61	At 20 h. 16 m. therm. 58.
♄ 16.	0. 37. 0	9. 50. 21	29,89	59½	At 20 h. 40 m. therm. 57.
☉ 17.	0. 40. 0	9. 57. 7	30,00	61	At 20 h. 40 m. therm. 61½.
☽ 18.	0. 35. 0	9. 55. 51	30,10	63½	At 20 h. 50 m. apparent time, therm. 64½.
♂ 19.	0. 36. 0	10. 0. 36	30,11	66½	At 20 h. 32 m. therm. 63½.
☿ 20.	0. 40. 0	10. 8. 22	30,11	66	4 h. 0 m. 69°. 20 h. 28′ 64.
♃ 21.	0. 49. 0	10. 21. 8	30,04	68	5 h. 46′ m. 69°½. 19 h. 40 m. 64.
♀ 22.	0. 46. 0	10. 21. 52	29,81	70	20 h. 52 m. 66½.
♄ 23.	0. 42. 0	10. 21. 35	29,70	68	
☉ 24.	0. 30. 0	10. 13. 17	29,83	64½	At 11 h. at night barometer was at 29,55 inches. A ſtrong wind all night and in the morning.
☽ 25.	0. 36. 0	10. 23. 1	29,86	63	At 21 h. therm. 60½.
26.	0. 44. 0	10. 34. 46	30,10	63½	At 21 h. therm. 62½.
☿ 27.	0. 32. 0	10. 26. 29	30,05	65	At 20 h. therm. 63½.
♃ 28.	0. 53. 0	10. 51. 17	29,90	66½	At 19 h. 17 m. therm. 64.

COMPARISONS of Mr. HARRISON's Watch with the Tranſit Clock of the ROYAL OBSERVATORY.

	Time per Watch.	Time per Clock.	Barometer.	Thermometer.	
1766.	H. M. S.	H. M. S.	Inches.	Deg.	
♀ Auguſt 29.	0. 46. 0	10. 48. 0	29,86	66	At 20 h. 30 m. therm. 64°.
♄ 30.	0. 45. 0	10. 50. 44	29,93	66	At 20 h. therm. 62.
☉ 31.	0. 42. 0	10. 51. 27	30,07	65	At 20 h. 45 m. therm. 60½.
☽ Sept. 1.	0. 57. 0	11. 10. 12	29,97	63	At 21 h. therm. 62.
♂ 2.	0. 56. 0	11. 12. 55	29,86	64	
☿ 3.	1. 0. 0	11. 20. 33	30,05	61½	At 20 h. 30 m. therm. 60.
♃ 4.	0. 55. 0	11. 19. 19	29,83	63½	At 21 h. therm. 61.
♀ 5.	0. 59. 0	11. 27. 1	29,77	62	At 20 h. 30 m. therm. 57.
♄ 6.	0. 56. 0	11. 27. 42	29,92	59½	At 21 h. therm. 60.
☉ 7.	1. 1. 0	11. 36. 24	29,62	62	
☽ 8.	0. 35. 0	11. 14. 2	29,39	61½	At 20 h. therm. 59½.
♂ 9.	0. 41. 0	11. 23. 45	30,02	58	At 21 h. 30 m. therm. 56.
☿ 10.	0. 39. 0	11. 25. 27	30,12	57½	
♃ 11.	0. 13. 0	11. 3. 6	29,86	62	At 20 h. therm. 58.
♀ 12.	0. 40. 0	11. 53. 53	29,76	60½	At 20 h. therm. 57. High wind in the night and in the morning.
♄ 13.	0. 45. 0	11. 42. 38	29,52	59	At 20 h. therm. 54.
☉ 14.	0. 34. 0	11. 35. 20	29,96	56	At 20 h. therm. 51.
☽ 15.	0. 43. 0	11. 48. 4	30,20	56	At 20 h. therm. 54½.
♂ 16.	0. 37. 0	11. 45. 46	30,17	58	At 20 h. 40 m. therm. 59.
☿ 17.	0. 32. 0	11. 44. 28	30,20	60½	At 20 h. therm. 60½.
♃ 18.	0. 51. 0	11. 7. 13	30,22	62	At 20 h. 45 m. therm. 59½.
♀ 19.	0. 41. 0	12. 0. 54	30,01	62	At 21 h. 45 m. therm. 60½.
♄ 20.	0. 39. 0	12. 2. 37	29,94	63	At 19 h. 30 m. therm. 60½.
☉ 21.	0. 38. 0	12. 5. 20	30,02	64	At 19 h. 30 m. therm. 62.
☽ 22.	0. 41. 0	12. 12. 2	29,96	66½	At 19 h. 30 m. therm. 63½.
♂ 23.	0. 47. 0	12. 21. 46	29,95	66½	At 21 h. 15 m. therm. 62.
☿ 24.	0. 47. 0	12. 25. 28	30,17	63½	At 20 h. 30 m. therm. 58.
♃ 25.	0. 58. 0	12. 40. 12	30,24	62	At 21 h. 15 m. therm. 59.
♀ 26.	0. 41. 0	12. 26. 53	30,11	61½	At 19 h. 19 m. therm. 57½.
♄ 27.	0. 48. 0	12. 37. 37	29,99	61	At 20 h. therm. 54.
☉ 28.	0. 37. 0	12. 30. 19	29,83	58½	At 20 h. 37 m. therm. 56.
☽ 29.	0. 43. 0	12. 40. 4	29,80	59	
♂ 30.	0. 39. 0	12. 39. 47	29,80	60	At 19 h. therm. 58.
☿ October 1.	0. 43. 0	12. 47. 32	29,76	61	At 20 h. 45 m. therm. 57.
♃ 2.	10. 20. A.M.	10. 27. 54	29,77	58	
♀ 3.	0. 45. 0	12. 57. 2	29,80	60	At 19 h. therm. 56.
♄ 4.	1. 26. 0	13. 41. 52	29,64	60	
☉ 5.	0. 41. 0	13. 0. 28	29,40	60	At 21 h. therm. 60.
☽ 6.	0. 50. 0	13. 13. 13	29,24	62	
♂ 7.	0. 38. 0	13. 4. 55	29,45	57½	At 18 h. 30 m. therm. 55.
☿ 8.	0. 27. 0	12. 57. 36	29,24	58	At 21 h. therm. 54.
♃ 9.	0. 53. 0	13. 27. 22	29,75	54	At 20 h. 45 m. therm. 51.
♀ 10.	0. 45. 0	13. 23. 3	29,86	52	At 22 h. 20 m. therm. 49.

COMPARISONS of Mr. HARRISON's Watch with the Tranſit Clock of the ROYAL OBSERVATORY.

1766.		Time per Watch. H. M. S.	Time per Clock. H. M. S.	Barometer. Inches.	Thermometer. Deg.	
♄	Oct. 11.	0. 29. 0	13. 10. 43	30,02	50	At 20 h. 42 m. therm. 45°.
☉	12.	0. 36. 0	13. 21. 26	30,01	49	At 20 h. 24 m. therm. 43½.
☽	13.	0. 48. 0	13. 37. 9	29,99	47½	At 20 h. 40 m. therm. 45½.
♂	14.	1. 6. 0	13. 58. 52	30,04	50	
☿	15.	1. 37. 0	14. 33. 36	30,14	53	At 22 h. therm. 52.
♃	16.	0. 45. 0	13. 45. 7	30,30	52½	At 20 h. 30 m. therm. 49.
♀	17.	1. 11. 0	14. 14. 50	30,50	50	At 21 h. 45 m. therm. 45½.
♄	18.	1. 0. 0	14. 7. 28	30,31	49	At 21 h. therm. 48.
☉	19.	0. 51. 0	14. 2. 5	30,17	51	At 22 h. therm. 53.
☽	20.	0. 52. 0	14. 6. 42	30,12	55	At 22 h. therm. 54½.
♂	21.	0. 50. 0	14. 8. 19	29,84	55	
☿	22.	0. 37. 0	13. 58. 54	30,18	50½	At 22 h. 45 m. therm. 51½.
♃	23.	0. 29. 0	13. 54. 29	29,80	52	
♀	24.	0. 44. 0	14. 13. 8	29,75	50	At 21 h. 45 m. therm. 46½.
♄	25.	0. 24. 0	13. 56. 41	29,84	48½	At 21 h. 30 m. therm. 51.
☉	26.	0. 42. 0	14. 18. 18	29,42	53½	There has been a ſtrong wind all night, and blows ſtill.
		8. 22. 0	21. 59. 27	29,42	55	The wind continues the ſame.
		16. 11. 0	5. 49. 37	29,38	55	The wind as before.
				29,35	55	At 20 h. apparent time. Wind continues.
☽	27.	0. 39. 0	14. 18. 53	29,30	56	Wind continues.
		10. 15. 0	23. 56. 19	29,24	56½	The wind gone down. Has been gradually going down ſince noon.
		17. 57. 0	7. 30. 28	29,23	56½	At 21 h. app. time, therm. 56½, barom. 29,27.
♂	28.	0. 33. 0	14. 16. 27	29,26	57½	The wind going down.
♀	29.	0. 41. 0	14. 28. 4	29,49	55	
		13. 32. 0	3. 20. 59	29,12	54	High wind. At 21 h. 45 m. therm. 53.
♃	30.	1. 2. 0	14. 52. 42	29,00	54	Very high wind. Has been all night.
				29,52	51	At 21 h. 30 m. Wind has gone down ſince noon.
♀	31.	0. 34. 0	14. 28. 13	29,63	51	
		12. 30. 0	2. 26. 1	29,94	48	At 20 h. apparent time. therm. 48.
♄	Nov. 1.	0. 42. 0	14. 39. 52	30,05	50	
☉	2.	1. 24. 0	15. 25. 34	29,93	51	
☽	3.	0. 46. 0	14. 51. 5	29,86	50	
♂	4.	0. 32. 0	14. 40. 39	29,95	52	
☿	5.	0. 40. 0	14. 52. 17	30,43	48	At 21 h. 30 m. therm. 43.
♃	6.	1. 12. 0	15. 28. 1	30,32	45½	At 9¼ h. therm. 45. At 21 h. 30 m. ther. 43½.
♀	7.	0. 28. 0	14. 47. 33	29,95	44½	At 22¼ h. therm. 43½.
♄	8.	0. 44. 0	15. 7. 13	29,68	44	At 17¾ h. therm. 41½.
☉	9.	0. 46. 0	15. 12. 52	30,10	45	At 21 h. 45 m. therm. 42.
☽	10.	0. 49. 0	15. 19. 31	30,13	45	At 22 h. therm. 44.
♂	11.	0. 45. 0	15. 19. 9	29,92	45	At 22½ h. therm. 47.

COMPARISONS of Mr. HARRISON's Watch with the Tranſit Clock of the ROYAL OBSERVATORY.

		Time per Watch.	Time per Clock.	Barometer.	Thermometer.	
	1766.	H. M. S.	H. M. S.	Inches.	Deg.	
☿	Nov. 12.	0. 49. 0	15. 26. 47	29,76	48½	At 21½ h. therm. 48°.
♃	13.	0. 50. 0	15. 31. 24	29,54	49	
♀	14.	0. 49. 0	15. 34. 2	29,55	47½	
♄	15.	0. 46. 0	15. 34. 40	29,77	44½	
☉	16.	0. 46. 0	15. 38. 18	29,61	48½	At 22 h. therm. 47½.
☽	17.	0. 54. 0	15. 49. 58	29,52	49	At 21½ h. therm. 51.
♂	18.	0. 52. 0	15. 51. 35	29,10	52	High wind. Has been all night. At 22 h. 15 m. therm. 53.
☿	19.	0. 49. 0	15. 52. 12	29,14	53½	Wind has been going down gradually ſince yeſterday noon. At 22¼ h. therm. 51.
♃	20.	1. 20. 0	16. 26. 54	29,39	52	
♀	21.	1. 18. 0	16. 28. 33	29,40	52	
♄	22.	0. 56. 0	16. 10. 9	29,79	50½	
☉	23.	0. 55. 0	16. 12. 48	30,18	48	At 20 h. 15 m. therm. 50.
☽	24.	0. 48. 0	16. 9. 26	30,14	51	
♂	25.	0. 43. 0	16. 8. 4	30,08	52½	Wm. Bayly.
☿	26.	0. 51. 0	16. 19. 45	30,00	47	At 21 h. therm. 41.
♃	27.	0. 53. 0	16. 25. 26	30,05	41½	
♀	28.	1. 3. 0	16. 39. 9	30,29	42½	At 21½ h. therm. 43.
♄	29.	0. 55. 0	16. 34. 48	30,26	44½	Wm. Bayly.
☉	30.	0. 58. 0	16. 41. 29	30,08	45	
☽	Dec. 1.	0. 42. 0	16. 29. 7	30,15	43½	Wm. Bayly.
♂	2.	0. 41. 0	16. 31. 48	30,19	44½	At 21½ h. therm. 42.
☿	3.	0. 33. 0	16. 27. 28	30,17	42½	At 21½ h. therm. 41.
♃	4.	1. 4. 0	17. 2. 14	30,12	41½	
♀	5.	0. 57. 0	16. 58. 54	30,12	41	
♄	6.	0. 53. 0	16. 58. 34	30,16	42	
☉	7.	0. 53. 0	17. 2. 15	29,84	41½	At 20½ h. therm. 41.
☽	8.	1. 10. 0	17. 22. 59	29,77	42	At 21½ h. therm. 39.
♂	9.	1. 6. 0	17. 22. 40	29,88	40	At 21 h. 53 m. therm. 41.
☿	10.	0. 59. 0	17. 19. 21	29,62	42½	At 21 h. 18 m. therm. 46.
♃	11.	1. 2. 0	17. 26. 0	29,22	46½	Wm. Bayly.
♀	12.	0. 56. 0	17. 23. 37	29,23	48	
♄	13.	1. 1. 0	17. 32. 16	29,77	44	At 21 h. 24 m. therm. 41.
☉	14.	0. 55. 0	17. 29. 56	29,98	41½	Wm. Bayly. At 21½ h. therm. 43.
☽	15.	0. 58. 0	17. 36. 38	29,50	44	Wm. Bayly. At 21¼ h. therm 42¼.
♂	16.	1. 14. 0	17. 56. 20	29,72	43	At 20¾ h. therm. 41.
☿	17.	0. 57. 0	17. 42. 59	29,62	42	At 21 h. 48 m. therm. 41.
♃	18.	1. 0. 0	17. 49. 39	29,29	42	Wm. Bayly.
♀	19.	0. 59. 0	17. 52. 21	29,52	38	
♄	20.	1. 3. 0	18. 0. 4	28,70	40	
☉	21.	0. 54. 0	17. 54. 44	28,80	39½	At 21½ h. therm. 39½.
☽	22.	0. 38. 0	17. 42. 26	29,40	40	At 21¾ h. therm. 36½.
♂	23.	1. 25. 0	18. 33. 19	29,91	37½	At 19 h. 23 m. therm. 34½.

COMPARISONS of Mr. HARRISON's Watch with the Tranſit Clock of the ROYAL OBSERVATORY.

		Time per Watch.	Time per Clock.	Barometer.	Thermometer.	
1766.		H. M. S.	H. M. S.	Inches.	Deg.	
☿	Dec. 24.	1. 24. 0	18. 36. 7	30,21	36	At 19 h. 45 m. therm. 35°.
♃	25.	1. 24. 0	18. 39. 55	30,25	35½	
		13. 34. 0	6. 51. 51	30,25	35	At 20 h. therm. 34½.
♀	26.	0. 54. 0	18. 13. 39	30,30	35	At 20 h. 15 m. therm. 34½.
♄	27.	0. 58. 0	18. 21. 29	30,42	35	Wm. Bayly. At 20½ h. therm. 35.
☉	28.	0. 56. 0	18 23. 18	30,47	35½	At 20 h. therm. 37½.
☽	29.	1. 5. 0	18. 36. 10	30,42	38	At 20 h. 10 m. therm. 38½.
♂	30.	1. 3. 0	18. 38. 1	30,22	39½	Wm. Bayly. At 20½ h. therm. 40.
☿	31.	1. 4. 0	18. 42. 51	30,23	41	At 20 h. therm. 40.
1767.						
♃	January 1.	1. 4. 0	18. 46. 41	30,04	40	At 19½ h. therm. 36.
♀	2.	1. 9. 0	18. 55. 33	29,43	36	High wind. Has been all night.
		15. 18. 0	9. 6. 52	29,29	35	At 20 h. therm. 35. Wind continues.
♄	3.	1. 23. 0	19. 13. 32	29,44	35½	
		12. 57. 0	6. 49. 27	29,60	34	At. 15 h. 45 m. therm. 33½. 19 h. 45 m. therm. 33. 23 h. therm. 32.
☉	4.	1. 11. 0	19. 5. 30	29,75	32½	
		12. 4. 0	6. 0. 20	29,85	31	
		20. 19. 0	14. 16. 44	29,85	28½	At 22 h. therm. 28½.
☽	5.	1. 10. 0	19. 8. 34	29,86	29½	
		14. 3. 0	8. 3. 44	29,70	31	At 20 h. therm. 31.
♂	6.	1. 2. 0	19. 4. 33	29,57	32	
		14. 53. 0	8. 57. 49	29,64	32½	At 20 h. therm. 32.
☿	7.	1. 0. 0	19. 6. 27	29,61	32½	
		13. 51. 0	7. 59. 32	29,44	33	At 20 h. therm. 33.
♃	8.	1. 44. 0	19. 54. 26	29,35	32	At 19 h. 43 m. therm. 31.
♀	9.	1. 3. 0	19. 17. 14	29,50	29	At 19 h. 36 m. therm. 26½. W. Bayly.
♄	10.	0. 56. 0	19. 14. 11	29,53	27	
		13. 8. 0	7. 28. 13	29,40	25	At 19 h. 48 m. therm. 27½.
☉	11.	1. 1. 0	19. 23. 11	29,21	29½	
		13. 8. 0	7. 32. 9	29,18	31	At 19 h. 54 m. therm. 30.
☽	12.	1. 34. 0	20. 0. 9	29,21	31	
		13. 6. 0	7. 34. 1	29,24	29½	At 19 h. 53 m. therm 27½.
♂	13.	1. 7. 0	19. 36. 59	29,14	28	
		12. 52. 0	7. 23. 54	28,93	30	W. Bayly. At 20 h. 5 m. therm. 31½.
☿	14.	1. 17. 0	19. 50. 54	29,05	32	
		12. 27. 0	7. 2. 40	29,14	33½	W. Bayly. At 19½ h. therm. 34½.
♃	15.	1. 7. 0	19. 44. 40	29,51	35	
		12. 50. 0	7. 29. 31	29,44	34	W. B. At 19 h. 19 m. therm. 33.
♀	16.	1. 2. 0	19. 43. 27	29,55	33	W. B.
		12. 1. 0	6. 44. 12	29,64	31½	W. B. At 19 h. 23 m. therm. 31.
♄	17.	0. 57. 0	19. 42. 16	29,71	31½	W. B.
		12. 53. 0	7. 40. 10	29,76	31	W. B. At 19 h. 40 m. therm. 30.

COMPARISONS of Mr. HARRISON's Watch with the Tranſit Clock of the ROYAL OBSERVATORY.

	Time per Watch.	Time per Clock.	Baro-meter.	Ther-mo-meter.	
1767.	H. M. S.	H. M. S.	Inches.	Deg.	
☉ Jan. 18.	1. 6. 0	19. 55. 7	29,77	31	
	12. 40. 4		29,82	28½	W. B. At 19 h. 23 m. therm. 29½.
☽ 19.	0. 48. 0	19. 41. 0	29,80	26½	W. B.
	12. 22. 0	7. 16. 54	29,84	25½	W. B. At 19 h. 51 m. therm. 24½.
♂ 20.	1. 9. 0	20. 6. 2	29,90	25½	
	13. 3. 0	8. 2. 0	30,00	26	W. B. At 19 h. 32 m. therm. 26.
☿ 21.	0. 55. 0	19. 55. 58	29,84	28½	It now thaws.
	13. 35. 0	8. 38. 1	29,78	31	At 19 h. 28 m. therm. 32.
♃ 22.	1. 57. 0	21. 2. 0	29,52	34	
	14. 20. 0	9. 26. 58	29,41	35	At 19 h. 49 m. therm. 36.
♀ 23.	0. 44. 0	19. 52. 37	29,72	36	
	13. 53. 0	9. 3. 42	29,87	35	At 19 h. 55 m. therm. 35.
♄ 24.	0. 45. 0	19. 57. 25	29,82	35	
	12. 23. 0	7. 37. 15	29,81	37½	W. B. At 20 h. therm. 38½.
☉ 25.	0. 57. 0	20. 13. 14	29,75	39½	
	11. 47. 0	7. 4. 56	29,73	40	W. B. At 19 h. 41 m. therm. 39.
☽ 26.	0. 59. 0	20. 19. 1	29,68	41	
	14. 5. 0	9. 27. 4	29,71	41	At 19 h. 41 m. therm. 41½.
♂ 27.	0. 57. 0	20. 20. 46	29,66	42½	At 12 h. 23 m. therm. 44. At 19 h. 48 m. therm. 44.
☿ 28.	0. 59. 0	20. 26. 32	29,60	45	At 11 h. 15 m. therm. 44. At 19 h. 29 m. therm. 43.
♃ 29.	1. 21. 0	20. 52. 19	29,81	42½	W. B. At 11 h. 11 m. therm. 42. At 19 h. 55 m. therm. 42½.
♀ 30.	1. 3. 0	20. 38. 2	29,76	44½	At 11 h. 25 m. therm. 45. At 19 h. 36 m. therm. 46.
♄ 31.	1. 2. 0	20. 40. 45	29,76	46	At 13 h. 16 m. therm. 47. At 19 h. 32 m. therm. 46½.
☉ Feb. 1.	1. 2. 0	20. 44. 27	29,85	47½	At 11 h. 19 m. therm. 47½. At 19 h. 28 m. therm. 47½.
☽ 2.	0. 51. 0	20. 37. 8	29,90	48	At 11 h. 34 m. therm. 47½. At 19 h. 33 m. therm. 45.
♂ 3.	1. 41. 0	21. 30. 59	29,87	47	At 11 h. 0 m. therm. 45½. At 19 h. 29 m. therm. 43½.
☿ 4.	1. 4. 0	20. 57. 36	29,74	44	At 12 h. 57 m. therm. 43. At 19 h. 30 m. therm. 42.
♃ 5.	1. 26. 0	21. 23. 23	29,62	42	At 11 h. 22 m. therm. 40½. At 19 h. 6 m. therm. 39½.
♀ 6.	0. 43. 0	20. 44. 2	29,66	39½	W. B. At 11 h. 28 m. therm. 40. At 19 h. 2 m. therm. 42.
♄ 7.	1. 18. 0	21. 22. 54	29,32	43½	W. B. At 11 h. 59 m. therm. 44. At 18 h. 53 m. therm. 44.
☉ 8.	1. 6. 0	21. 14. 35	29,05	45	W. B. At 11 h. 10 m. therm. 45. At 18 h. 49 m. therm. 44½.

COMPARISONS of Mr. HARRISON's Watch with the Tranſit Clock of the ROYAL OBSERVATORY.

	Time per Watch.	Time per Clock.	Barometer.	Thermometer.	
1767.	H. M. S.	H. M. S.	Inches.	Deg.	
☽ Feb. 9.	0. 53. 0	21. 5. 15	29,29	44	At 11 h. 31. m. therm. 43½. At 19 h. 15. m. therm. 44.
♂ 10.	0. 56. 0	21. 11. 58	29,17	45	At 11. h. 40 m. therm. 45. At 19. h. 13. m. therm. 44½.
☿ 11.	0. 53. 0	21. 12. 38	29,37	45	At 11 h. 29 m. therm. 46½. At 19 h. 12 m. therm. 46.
♃ 12.	1. 30. 0	21. 53. 25	28,85	45½	At 12 h. 35 m. therm. 43½. At 19 h. 14 m. therm. 41.
♀ 13.	0. 50. 0	21. 17. 2	29,38	42½	At 12 h. 16 m. therm. 44½. At 19 h. 11 m. therm. 44.
♄ 14.	0. 55. 0	21. 25. 46	29,15	45	At 13 h. 13 m. therm. 46. At 19 h. 10 m. therm. 45½.
☉ 15.	1. 12. 0	21. 46. 31	29,55	46	At 11 h. 28 m. therm. 45½. At 19 h. 7 m. therm. 42½.
☽ 16.	1. 12. 0	21. 50. 15	29,63	44	At 11 h. 54 m. therm. 45. At 19 h. 18 m. therm. 46.
♂ 17.	1. 22. 0	22. 3. 59	29,34	47½	At 10 h. 46 m. therm. 49½. At 19 h. 14 m. therm. 48.
☿ 18.	1. 27. 0	22. 12. 39	29,44	49	At 11 h. 41. m. therm. 43½. At 19 h. 12 m. therm. 43.
♃ 19.	1. 35. 0	22. 24. 23	29,93	45½	At 10 h. 57 m. therm. 44. At 19 h. 1 m. therm. 43.
♀ 20.	1. 16. 0	22. 9. 2	29,46	44½	At 10 h. 48 m. therm. 45. At 18 h. 50 m. therm. 44½.
♄ 21.	1. 37. 0	22. 33. 48	29,37	46	At 10 h. 50 m. therm. 44½. At 19 h. 24 m. therm. 44½.
☉ 22.	1. 27. 0	22. 27. 28	29,35	45	At 10 h. 57 m. therm. 43. At 18 h. 50 m. therm. 41.
☽ 23.	1. 5. 0	22. 9. 8	29,76	43	At 11 h. 17 m. therm. 43. At 19 h. 11 m. therm. 42.
♂ 24.	1. 18. 0	22. 25. 52	29,84	44	At 11 h. 4 m. therm. 45. At 19 h. 27 m. therm. 43.
☿ 25.	1. 9. 0	22. 20. 32	29,84	44½	W. B. At 11 h. 52 m. therm. 45. At 19 h. 18 m. therm. 44½.
♃ 26.	1. 25. 0	22. 40. 16	29,42	46½	W. B. At 10 h. 31 m. therm. 48. At 19 h. 1 m. therm. 47.
♀ 27.	1. 5. 0	22. 23. 53	29,32	47½	W. B. At 10 h. 47 m. therm. 46. At 18 h. 46 m. therm. 44.
♄ 28.	1. 39. 0	23. 1. 39	29,50	45½	At 10 h. 35 m. therm. 43. At 18 h. 2 m. therm. 42.
☉ March 1.	1. 11. 0	22. 37. 16	29,89	44	At 10 h. 40 m. therm. 45. At 19 h. 19 m. therm. 44½.
☽ 2.	1. 9. 0	22. 38. 56	29,61	46	At 10 h. 36 m. therm. 45½. At 18 h. 56 m. therm. 42½.

COMPARISONS of Mr. HARRISON's Watch with the Tranſit Clock of the ROYAL OBSERVATORY.

	Time per Watch.	Time per Clock.	Barometer.	Thermometer.	
1767.	H. M. S.	H. M. S.	Inches.	Deg.	
♂ March 3.	1. 9. 0	22. 42. 36	29,63	44	At 11 h. 12 m. therm. 43. At 18 h. 56 m. therm. 43.
☿ 4.	1. 4. 0	22. 41. 15	29,85	44	At 11 h. 38 m. therm. 44½. At 18 h. 37 m. therm. 44.
♃ 5.	1. 20. 0	23. 0. 58	30,14	45½	W. B. At 11 h. 25 m. therm. 45½. At 19 h. 4 m. therm. 45.
♀ 6.	1. 12. 0	22. 56. 37	30,13	45½	At 11 h. 26 m. therm. 45½. At 19 h. 0 m. therm. 45.
♄ 7.	1. 4. 0	22. 52. 16	29,96	45	At 12 h. 37 m. therm. 46. At 18 h. 36 m. therm. 43½.
☉ 8.	1. 39. 0	23. 31. 1	29,96	46	At 12 h. 4 m. therm. 43½. At 18 h. 35 m. therm. 41½.
☽ 9.	1. 17. 0	23. 12. 38	30,04	44½	At 11 h. 51. m. therm. 43. At 19 h. 4 m. therm. 41½.
♂ 10.	1. 42. 0	23. 41. 21	29,96	45	At 11 h. 58 m. therm. 43½. At 18 h. 20 m. therm. 43.
☿ 11.	1. 38. 0	23. 41. 0	29,77	44	At 11 h. 53 m. therm. 44. At 18 h. 32 m. therm. 43½.
♃ 12.	1. 34. 0	23. 40. 38	29,63	44	W. B. At 10 h. 29 m. therm. 43½. At 18 h. 38 m. therm. 41.
♀ 13.	1. 44. 0	23. 54. 20	29,57	44½	At 10 h. 40 m. therm. 44. At 18 h. 34 m. therm. 41.
♄ 14.	1. 27. 0	23. 40. 56	29,58	41	W. B. At 11 h. 2 m. therm. 40½. At 18 h. 36 m. therm. 38½.
☉ 15.	1. 46. 0	0. 3. 40	29,72	39¾	W. B. At 11 h. 38 m. Therm. 37. At 18 h. 47 m. therm 31.
☽ 16.	1. 24. 0	23. 45. 20	30,04	39	W. B. At 11 h. 14 m. therm. 39½. At 18 h. 28 m. therm. 42.
♂ 17.	1. 31. 0	23. 56. 2	29,42	43	At 10 h. 31 m. therm. 43½. At 18 h. 30 m. therm. 42.
☿ 18.	1. 35. 0	0. 3. 41	29,48	43½	W. B. At 10 h. 27 m. therm. 46. At 18 h. 36 m. therm. 44.
♃ 19.	1. 5. 0	23. 37. 15	29,00	45½	W. B. At 11 h. 3 m. therm. 45. At 18 h. 22 m. therm. 45.
♀ 20.	1. 30. 0	0. 5. 57	29,40	47	At 11 h. 50 m. therm. 45. At 18 h. 19 m. therm. 44.
♄ 21.	1. 40. 0	0. 19. 36	29,64	46½	W. B. At 9 h. 56 m. therm. 45. At 18 h. 40 m. therm. 43.
☉ 22.	1. 38. 0	0. 21. 15	29,84	45	W. B. At 10 h. 37 m. therm. 43. At 18 h. 36 m. therm. 34.
☽ 23.	1. 18. 0	0. 4. 52	29,82	41	At 10 h. 0 m. therm. 41. At 18 h. 0 m. therm. 40.
♂ 24.	1. 39. 0	0. 29. 36	29,79	42½	W. B. At 10 h. 2 m. therm. 42. At 18 h. 0 m. therm. 39.

CALCULATIONS

CALCULATIONS

OF THE

GOING of Mr. Harriſon's WATCH

FROM

DAY TO DAY.

EXPLANATION

OF THE

CALCULATIONS

OF THE

GOING of Mr. Harriſon's WATCH from Day to Day.

THE firſt column ſhews the days of the month; the ſecond the interval of time, according to the watch, between the atteſted compariſons of the watch each day with the tranſit clock; the third column contains the quantity of minutes and ſeconds which the watch loſes of the clock in the ſaid interval; the fourth column ſhews how much the watch ſhould loſe of the clock in 24 hours of the watch according to the proportion expreſſed in the ſecond and third columns; the fifth column gives the daily gaining or loſing of the tranſit clock with reſpect to ſidereal time, as deduced from the obſerved tranſits of the fixed ſtars over the meridian, the ſign + being ſet down in the caſe of the clock's loſing, and — in the caſe of its getting. This correction, applied to the numbers of the fourth column, produces the ſixth column, or the loſing of the watch from day to day with reſpect to ſidereal time, in 24 hours of the watch. The ſeventh column gives the daily gaining of the watch upon mean time (except on ſome few days when it exhibits its loſing) and is found by taking the difference of the preceding column and 3′ 56″,5, ſidereal time gaining ſo much much upon mean ſolar time in 24 hours of mean time, or, rather more exactly, in 24 hours of the watch, which generally correſponds to leſs than 24 hours of mean time by near 20 ſeconds. The eighth column contains the mean ſtate of the thermometer for the day; and the ninth and laſt column ſhews the mean ſtate of the barometer.

CALCULATIONS of the Going of Mr. HARRISON's Watch from Day to Day.

		Interval of Compariſons.	Watch loſes of Clock.	Watch loſes of Clock in 24 hours of Watch.	Clock varies from Sidereal Time per Day.	Watch loſes of Sidereal Time in 24 h. of Watch.	Watch gets on Mean Time per Day.	Mean State of Thermom.	Mean State of Barom.	
1766.		H. M.	M. S.	M. S.	S.	M. S.	S.	Deg.	Inch.	
		The watch in a horizontal poſition, with the face upwards.								
May 6 to	7	23. 30	3. 33	3. 37,53	+1,34	3. 38,9	17,6	54	29,9	By a mean of 11 days compariſons from May 6th to May 17th, the watch being in a horizontal poſition, with the face upwards, gets at the rate of 19",51 per day upon mean time.
7	8	24. 4	3. 37	3. 36, 4	+1,22	3. 37,6	18,9	57	29,7	
8	9	23. 52	3. 34	3. 37, 2	+1,17	3. 36,4	20,1	55	29,5	
9	10	24. 4	3. 36	3. 35, 4	+1,13	3. 36,5	20,0	54	29,3	
10	11	23. 57	3. 36	3. 36, 4	+1,16	3. 37,6	18,9	49	29,5	
11	12	24. 1	3. 36	3. 35, 9	+1,12	3. 37,0	19,5	50	29,6	
12	13	24. 9	3. 37	3. 35, 6	+1,05	3. 36,6	19,9	51	29,6	
13	14	23. 49	3. 33	3. 34,76	+1,02	3. 35,8	20,7	52	29,8	
14	15	24. 8	3. 37	3. 35,70	+1,02	3. 36,8	19,7	52	30,1	
15	16	24. 2	3. 36	3. 35,70	+0,80	3. 36,5	20,0	54	30,2	
16	17	24. 9	3. 38	3. 36,64	+0,58	3. 37,2	19,3	56	30,1	
		The watch inclined under an angle of 20° to the horizon, with the face upwards, and hour XII higheſt.								
17	18	23. 47	3. 34	3. 35,95	+0,50	3. 36,4	20,1	57	30,0	By a mean of theſe five compariſons from May 17th to 22d, the watch being inclined under an angle of 20° to the horizon, with the face upwards, and the hour XII higheſt, gets at the rate of 19",72 per day upon mean time.
18	19	23. 56	3. 35	3. 35,60	+0, 6	3. 36,2	20,3	55	29,9	
19	20	24. 25	3. 41	3. 37,23	+0, 6	3. 37,8	18,7	49	29,9	
20	21	24. 5	3. 38	3. 37,25	+0,6	3. 37,8	18,7	51	30,0	
21	22	23. 33	3. 31	3. 35,03	+0,70	3. 35,7	20,8	50	30,0	
		The watch inclined under an angle of 20° to the horizon, with the face upwards, and hour VI higheſt.								
22	23	24. 35	3. 36	3. 31,04	+0,8	3. 31,8	24,7	52	29,9	By a mean of theſe five days compariſons from May 22d to 27th, the watch being inclined under an angle of 20° to the horizon, with the face upwards, and the hour VI higheſt, gets at the rate of 23",02 per day upon mean time.
23	24	23. 33	3. 28	3. 31,97	+0,70	3. 32,7	23,8	53	29,8	
24	25	24. 24	3. 38	3. 34,43	+0,70	3. 35,1	21,4	52	29,7	
25	26	23. 29	3. 32	3. 36,66	+0,70	3. 37,4	19,1	55	29,7	
26	27	24. 2	3. 30	3. 29,70	+0,70	3. 30,4	26,1	55	29,7	
		Watch inclined under an angle of 20° to the horizon, with the face upwards, and hour III higheſt.								
27	28	24. 31	3. 48	3. 43,20	+0,7	3. 43,9	12,6	52	29,6	By a mean of theſe ſeven days compariſons from May 27th to June 3d, the watch being inclined under an angle of 20° to the horizon, with the face upwards, and the hour III higheſt, gets at the rate of 12",43 per day upon mean time.
28	29	23. 54	3. 44	3. 44,94	+0,7	3. 45,6	10,9	49	29,5	
29	30	24. 22	3. 45	3. 41,61	+0,7	3. 42,3	14,2	54	29,4	
30	31	23. 12	3. 38	3. 44,79	+0,7	3. 45,5	11,0	53	29,4	
31 to June	1	24. 4	3. 44	3. 43,38	+0,7	3. 44,1	12,4	50	29,7	
June 1	2	24. 11	3. 45	3. 43,29	+0,1	3. 43,4	13,1	51	29,9	
2	3	23. 53	3. 43	3. 44,07	—0,36	3. 43,7	12,8	54	29,8	

CALCULATIONS of the Going of Mr. HARRISON's Watch from Day to Day.

	Interval of Compariſons.	Watch loſes of Clock.	Watch loſes of Clock in 24 hours of Watch.	Clock varies from Sidereal Time per Day.	Watch loſes of Sidereal Time in 24 h. of Watch.	Watch gets on Mean Time per Day.	Mean State of the Thermom.	Mean State of the Barom.	
1766.	H. M.	M. S.	M. S.	S.	M. S.	S.	Deg.	Inch.	
	The watch inclined under an angle of 20° to the horizon, with the face upwards, and hour IX higheſt.								
June 3 to 4	23. 58	3. 42	3. 42,31	—0,4	3. 41,9	14,6	56	29,7	By a mean of theſe five days compariſons from June 3d to the 8th, the watch being inclined under an angle of 20° to the horizon, with the face upwards, and the hour IX higheſt, gets at the rate of 14″,06 per day upon mean time.
4 5	23. 54	3. 42	3. 42,61	—0,5	3. 42,1	14,4	57	29,6	
5 6	24. 17	3. 45	3. 42,38	—0,8	3. 41,6	14,9	57	29,7	
6 7	23. 54	3. 45	3. 45,94	—0,8	3. 45,1	11,4	59	29,7	
7 8	23. 52	3. 41	3. 42,24	—0,75	3. 41,5	15,0	60	29,8	
	The watch in a vertical poſition, with the hour XII higheſt.								
8 9	24. 6	3. 38	3. 27,14	—0,8	3. 26,3	30,2	60	29,9	By a mean of theſe five days compariſons from June 8th to the 13th, the watch being in a vertical poſition, with the hour XII higheſt, gets at the rate of 29″,52 per day upon mean time.
9 10	24. 26	3. 31	3. 27,26	—0,6	3. 26,7	29,8	59	30,0	
10 11	23. 26	3. 23	3. 27,90	—0,5	3. 27,4	29,1	60	29,9	
11 12	24. 13	3. 30	3. 28,12	—0,8	3. 27,3	29,2	59	29,7	
12 13	23. 53	3. 27	3. 28,01	—0,8	3. 27,2	29,3	56	29,8	
	The watch in a vertical poſition, with the hour VI higheſt.								
13 14	24. 11	4. 2	4. 0,15	—0,7	3. 59,4	— 2,9	56	29,8	By a mean of theſe five days compariſons from June 13th to the 18th, the watch being in a vertical poſition, with the hour VI higheſt, loſes at the rate of 2″,04 per day upon mean time.
14 15	23. 40	3. 56	3. 59,32	—0,8	3. 58,5	— 2,0	57	29,7	
15 16	24. 8	4. 1	3. 58,66	—0,95	3. 57,7	— 1,2	56	29,7	
16 17	24. 11	4. 1	3. 59,17	—1,05	3. 58,1	— 1,6	57	29,6	
17 18	23. 59	4. 0	4. 0,17	—1,12	3. 59,0	— 2,5	55	29,5	
	The watch in a vertical poſition, with the hour III higheſt.								
18 19	24. 2	3. 54	3. 53,68	—1,1	3. 52,6	3,9	56	29,6	By a mean of theſe five days compariſons from June 13th to the 23d, the watch being in a vertical poſition, with the hour III higheſt, gets at the rate of 3″,54 per day upon mean time.
19 20	24. 17	3. 55	3. 52,26	—1,05	3. 51,2	5,3	53	29,8	
20 21	24. 1	3. 56	3. 55,84	—1,0	3. 54,8	1,7	56	29,9	
21 22	24. 2	3. 55	3. 54,67	—1,0	3. 53,7	2,8	65	30,0	
22 23	23. 32	3. 49	3. 53,54	—1,0	3. 52,5	4,0	61	30,2	
	The watch in a vertical poſition, with the hour IX higheſt.								
23 24	24. 0	3. 57	3. 57,00	—1,0	3. 56,0	0,5	62	30,1	By a mean of theſe eight days compariſons from June the 23d to July 1ſt, the watch being in a vertical poſition, with the hour IX higheſt, gets at the rate of 4″,02 per day upon mean time.
24 25	24. 5	3. 56	3. 55,18	—1,08	3. 54,1	2,4	62	29,9	
25 26	23. 54	3. 54	3. 54,98	—1,1	3. 53,9	2,6	63	29,7	
26 27	24. 16	3. 56	3. 53,40	—1,1	3. 52,3	4,2	59	29,6	
27 28	23. 51	3. 51	3. 52,45	—1,0	3. 51,4	5,1	58	29,7	
28 29	23. 52	3. 51	3. 52,29	—1,0	3. 51,3	5,2	57	29,6	
29 30	24. 1	3. 52	3. 51,84	—1,2	3. 50,6	5,9	58	29,5	
30 to July 1	24. 9	3. 53	3. 51,55	—1,35	3. 50,20	6,3	54	29,5	

CALCULATIONS of the Going of Mr. HARRISON's Watch from Day to Day.

		Interval of Compariſons.	Watch loſes of Clock.	Watch loſes of Clock in 24 hours of Watch.	Clock varies from Sidereal Time per Day.	Watch loſes of Sidereal Time in 24 h. of Watch.	Watch gets on Mean Time per Day.	Mean State of the Thermom.	Mean State of the Barom.
1766		H. M.	M. S.	M. S.	S.	M.S.	S.	Deg.	Inch.
		The watch in a horizontal poſition, with the face downwards.							
July 1	to 2	23. 41	3. 42	3. 44,97	—1,40	3. 43,6	13,0	57	29,6
2	3	24. 16	3. 47	3. 44,51	—1,50	3. 43,0	13,6	56	29,8
3	4	24. 20	3. 49	3. 45,86	—1,60	3. 44,3	12,3	58	29,9
4	5	23. 39	3. 43	3. 46,30	—1,50	3. 44,8	11,8	60	29,9
5	6	24. 0	3. 45	3. 45,00	—1,40	3. 43,6	13,0	61	29,9
		The watch, from henceforward, always in a horizontal poſition, with the face upwards.							
6	7	24. 1	3. 42	3. 41,88	—1,7	3. 40,2	16,3	63	29,8
7	8	23. 59	3. 42	3. 42,15	—1,86	3. 40,3	16,2	63	29,8
8	9	24. 8	3. 43	3. 41,77	—1,90	3. 39,9	16,6	64	29,9
9	10	24. 0	3. 40	3. 40,00	—1,95	3. 38,0	18,5	64	29,8
10	11	23. 50	3. 38	3. 39,52	—1,95	3. 37,6	18,9	63	29,6
11	12	24. 0	3. 40	3. 40,00	—2,0	3. 38,0	18,5	62	29,6
12	13	24. 27	3. 44	3. 39,88	—2,1	3. 37,8	18,7	61	29,8
13	14	23. 39	3. 36	3. 39,20	—2,3	3. 36,9	19,6	63	29,9
14	15	23. 52	3. 38	3. 39,22	—2,4	3. 36,8	19,7	63	29,7
15	16	24. 29	3. 45	3. 40,56	—2,4	3. 38,2	18,3	62	29,6
16	17	23. 40	3. 36	3. 39,04	—2,4	3. 36,6	19,9	61	29,7
17	18	23. 56	3. 40	3. 40,61	—2,5	3. 38,1	18,4	63	29,9
18	19	24. 0	3. 39	3. 39,00	—2,7	3. 36,3	20,2	66	30,0
19	20	24. 2	3. 40	3. 39,70	—2,6	3. 37,1	19,4	65	30,0
20	21	23. 56	3. 38	3. 38,61	—2,6	3. 36,0	20,5	64	29,9
21	22	24. 7	3. 40	3. 38,94	—2,63	3. 36,3	20,2	63	29,8
22	23	23. 56	3. 40	3. 40,61	—2,7	3. 37,9	18,6	61	29,8
23	24	24. 2	3. 41	3. 40,70	—2,7	3. 38,0	18,5	60	29,7
24	25	24. 0	3. 39	3. 39,00	—2,8	3. 36,2	20,3	61	29,6
25	26	23. 55	3. 39	3. 39,76	—2,75	3. 37,0	19,5	61	29,5
26	27	24. 5	3. 41	3. 40,24	—2,84	3. 37,4	19,1	60	29,6
27	28	24. 14	3. 42	3. 39,87	—2,9	3. 36,9	19,6	60	29,7
28	29	24. 4	3. 40	3. 39,39	—2,9	3. 36,5	20,0	59	29,8
29	30	24. 12	3. 42	3. 40,17	—2,94	3. 37,2	19,3	59	29,7
30	31	23. 54	3. 38	3. 38,91	—3,1	3. 35,8	20,7	61	29,7
31	to Aug. 1	23. 54	3. 40	3. 40,92	—3,2	3. 37,7	18,8	61	29,9
Aug. 1	2	24. 3	3. 42	3. 41,54	—3,3	3. 38,2	18,3	64	29,8
2	3	By the tranſits of the Sun, obſerved Auguſt 2d and 3d, the watch gets from 2d to 3d on mean time in 24 hours of watch - -					18,2	63	29,7
3	4	23. 50	3. 38	3. 39,52	+ 0,8	3. 40,3	16,2	63	29,9
4	5	24. 21	3. 41	3. 37,82	+ 1,0	3. 38,8	17,7	63	30,0
5	6	23. 36	3. 35	3. 38,64	+ 1,0	3. 39,6	16,9	65	30,1
6	7	24. 5	3. 43	3. 42,29	+ 1,1	3. 43,4	13,1	68	30,1

By a mean of theſe five days compariſons from July 1ſt to the 6th, the watch being in a horizontal poſition, with the face downwards, gets at the rate of 12",64 per day upon mean time.

CALCULATIONS of the Going of Mr. HARRISON's Watch from Day to Day.

		Interval of Compariſons.	Watch loſes of Clock.	Watch loſes of Clock in 24 Hours of Watch.	Clock varies from Sidereal Time per Day.	Watch loſes of Sidereal Time in 24 Hours of Watch.	Watch gets on Mean Time per Day.	Mean State of the Thermometer.	Mean State of the Barometer.
1766.		H. M.	M. S.	M. S.	S.	M. S.	S.	Deg.	Inches.
Aug. 7 to	8	23. 53	3. 41	3. 4 ,07	+ 1,6	3. 48,7	12,8	69	30,1
8	9	23. 57	3. 42	3. 42,46	+ 1,77	3. 44,2	12,3	69	30,1
9	10	24. 4	3. 42	3. 41,38	+ 1,53	3. 42,9	13,6	65	30,1
10	11	23. 55	3. 41	3. 41,77	+ 1,39	3. 43,2	13,3	60	30,0
11	12	24. 2	3. 43	3. 42,69	+ 1,37	3. 44,1	12,4	57	30,0
12	13	23. 58	3. 44	3. 44,31	+ 1,25	3. 45,6	10,9	59	30,1
13	14	24. 20	3. 49	3. 45,86	+ 1,11	3. 47,0	9,5	59	30,1
14	15	23. 40	3. 43	3. 46,14	+ 1,11	3. 47,2	9,3	61	29,8
15	16	24. 2	3. 46	3. 45,69	+ 0,90	3. 46,6	9,9	58	29,8
16	17	24. 3	3. 46	3. 45,53	+ 0,8	3. 46,3	10,2	57	29,9
17	18	23. 55	3. 44	3. 44,78	+ 0,8	3. 45,6	10,9	62	30,0
18	19	24. 1	3. 45	3. 44,84	+ 0,8	3. 45,6	10,9	65	30,1
19	20	24. 4	3. 46	3. 45,37	+ 0,97	3. 46,3	10,2	64	30,1
20	21	24. 5	3. 46	3. 45,22	+ 0,97	3. 46,2	10,3	64	30,1
21	22	23. 57	3. 44	3. 44,47	+ 0,94	3. 45,4	11,1	65	29,9
22	23	23. 56	3. 43	3. 43,62	+ 1,1	3. 44,7	11,8	67	29,8
23	24	23. 48	3. 42	3. 43,86	+ 1,08	3. 44,9	11,6	64	29,8
24	25	24. 6	3. 44	3. 43,07	+ 0,73	3. 43,8	12,7	62	29,8
25	26	24. 8	3. 45	3. 43,75	+ 0,84	3. 44,6	11,9	61	30,0
26	27	23. 48	3. 43	3. 44,87	+ 0,91	3. 45,8	10,7	63	30,1
27	28	24. 21	3. 48	3. 44,73	+ 0,97	3. 45,7	10,8	64	30,0
28	29	23. 53	3. 43	3. 44,08	+ 1,06	3. 45,1	11,4	65	29,9
29	30	23. 59	3. 44	3. 44,15	+ 1,11	3. 45,2	11,3	64	29,9
30	31	23. 57	3. 43	3. 43,46	+ 1,17	3. 44,6	11,9	63	30,0
31 to Sept.	1	24. 15	3. 45	3. 42,69	+ 1,18	3. 43,9	12,6	61	30,0
Sept. 1	2	23. 59	3. 43	3. 43,15	+ 1,25	3. 44,4	12,1	62	29,9
2	3	24. 4	3. 43	3. 42,38	+ 1,33	3. 43,7	12,8	60	29,9
3	4	23. 55	3. 41	3. 41,77	+ 1,32	3. 43,1	13,4	60	29,9
4	5	24. 4	3. 42	3. 41,39	+ 1,38	3. 42,8	13,7	61	29,8
5	6	23. 57	3. 41	3. 41,46	+ 1,53	3. 43,0	13,5	58	29,9
6	7	24. 5	3. 42	3. 41,24	+ 1,69	3. 42,9	13,6	60	29,8
7	8	23. 34	3. 38	3. 42,01	+ 1,80	3. 43,8	12,7	60	29,5
8	9	24. 6	3. 43	3. 42,08	+ 1,88	3. 43,9	12,6	60	29,7
9	10	23. 58	3. 42	3. 42,31	+ 1,89	3. 44,2	12,3	56	30,1
10	11	23. 34	3. 39	3. 43,03	+ 1,86	3. 44,9	11,6	58	30,0
11	12	24. 27	3. 47	3. 42,82	+ 1,69	3. 44,5	12,0	59	29,8
12	13	24. 5	3. 45	3. 44,23	+ 1,69	3. 45,9	10,6	58	29.6
13	14	23. 49	3. 42	3. 43,71	+ 1,67	3. 45,4	11,1	55	29,7
14	15	24. 9	3. 44	3. 42,61	+ 1,77	3. 44,4	12,1	53	30,1
15	16	23. 54	3. 42	3. 42,93	+ 1,83	3. 44,7	11,8	56	30,2
16	17	23. 55	3. 42	3. 42,77	+ 1,63	3. 44,4	12,1	59	30,2
17	18	24. 19	3. 45	3. 42,07	+ 1,63	3. 43,7	12,8	61	30,2
18	19	23. 50	3. 41	3. 42,55	+ 1,59	3. 44,1	12,4	60	30,1
19	20	23. 58	3. 43	3. 43,31	+ 1,50	3. 44,8	11,7	61	30,0
20	21	23. 59	3. 43	3. 43,15	+ 1,45	3. 44,6	11,9	62	30,0
21	22	24. 3	3. 42	3. 41,54	+ 1,49	3. 43,0	13,5	64	30,0

CALCULATIONS of the Going of Mr. HARRISON's Watch from Day to Day.

	Interval of Compariſons.	Watch loſes of Clock.	Watch loſes of Clock in 24 Hours of Watch.	Clock varies from Sidereal Time per Day.	Watch loſes of Sidereal Time in 24 Hours of Watch.	Watch gets on Mean Time per Day.	Mean State of the Thermometer.	Mean State of the Barometer.	
1766.	H. M.	M. S.	M. S.	S.	M. S.	S.	Deg.	Inches.	
Sept. 22 to 23	24. 6	3. 44	3. 43,07	+ 1,54	3. 44,6	11,9	65	30,0	
23 24	24. 0	3. 42	3. 42,00	+ 1,61	3. 43,6	12,9	62	30,1	
24 25	24. 11	3. 44	2. 43,30	+ 1,62	3. 43,9	12,6	59	30,2	
25 26	23. 43	3. 41	3. 43,64	+ 1,56	3. 45,2	11,3	59	30,2	
26 27	24. 7	3. 44	3. 42,92	+ 1,73	3. 44,6	11,9	59	30,0	
27 28	23. 49	3. 42	3. 43,71	+ 1,58	3. 45,3	11,2	58	29,9	
28 29	24. 6	3. 45	3. 44,07	+ 1,21	3. 45,3	11,2	57	29,8	
29 30	23. 56	3. 43	3. 43,62	+ 1,20	3. 44,8	11,7	58	29,8	
30 to Oct. 1	24. 4	3. 45	3. 44,38	+ 1,26	3. 45,6	10,9	59	29,8	
Oct. 1 2	21. 37	3. 22	3. 44,27	+ 1,27	3. 45,5	11,0	58	29,8	
2 3	26. 25	4. 8	3. 45,31	+ 1,27	3. 46,6	9,9	58	29,8	
3 4	24. 41	3. 50	3. 43,63	+ 1,08	3. 44,7	11,8	58	29,7	
4 5	23. 15	3. 35	3. 42,97	+ 1,08	3. 44,0	12,5	58	29,5	
5 6	24. 9	3. 45	3. 43,60	+ 1,08	3. 44,7	11,8	60	29,3	
6 7	23. 48	3. 42	3. 43,86	+ 1,15	3. 45,0	11,5	58	29,3	
7 8	23. 49	3. 41	3. 42,70	+ 1,20	3. 43,9	12,6	56	29,4	
8 9	24. 26	3. 46	3. 41,99	+ 1,30	3. 43,3	13,2	54	29,5	
9 10	23. 52	3. 41	3. 42,23	+ 1,30	3. 43,5	13,0	51	29,8	
10 11	23. 44	3. 40	3. 42,48	+ 1,62	3. 44,1	12,4	49	29,9	
11 12	24. 7	3. 43	3. 41,93	+ 1,84	3. 43,8	12,7	46	30,0	
12 13	24. 12	3. 43	3. 41,16	+ 1,91	3. 43,1	13,4	44	30,0	
13 14	24. 18	3. 43	3. 40,45	+ 1,71	3. 42,1	14,4	47	30,0	
14 15	24. 31	3. 44	3. 39,29	+ 1,25	3. 40,5	16,0	50	30,1	
15 16	23. 8	3. 31	3. 38,90	+ 1,25	3. 40,1	16,4	52	30,2	
16 17	24. 26	3. 43	3. 39,05	+ 1,16	3. 40,2	16,3	49	30,4	
17 18	23. 49	3. 38	3. 39,37	+ 1,22	3. 40,6	15,9	46	30,4	
18 19	23. 51	3. 37	3. 38,36	+ 1,15	3. 39,5	17,0	48	30,2	
19 20	24. 1	3. 37	3. 36,85	+ 0,86	3. 37,7	18,8	52	30,1	
20 21	23. 58	3. 37	3. 37,30	+ 0,67	3. 38,0	18,5	54	30,0	
21 22	23. 47	3. 35	3. 36,96	+ 0,78	3. 37,7	18,8	51	30,0	
22 23	23. 52	3. 35	3. 36,20	+ 1,07	3. 37,3	19,2	51	30,0	
23 24	24. 15	3. 39	3. 36,75	+ 1,39	3. 38,1	18,4	50	29,8	
24 25	23. 40	3. 33	3. 36,00	+ 1,06	3. 37,0	19,5	47	29,8	
25 26	24. 15	3. 37	3. 34,32	+ 0,74	3. 35,0	21,5	49	29,6	There has been a ſtrong wind all night, and blows ſtill.
26 27	23. 57	3. 35	3. 35,45	+ 0,65	3. 36,1	20,4	55	29,4	
27 28	23. 54	3. 34	3. 34,89	+ 0,41	3. 35,3	21,2	56	29,3	
28 29	24. 8	3. 37	3. 35,80	+ 0,41	3. 36,2	20,3	55	29,4	
29 30	24. 21	3. 38	3. 34,87	+ 0,40	3. 35,3	21,2	53	29,2	
30 31	23. 32	3. 31	3. 35,18	+ 0,40	3. 35,6	20,9	52	20,3	
31 to Nov. 1	24. 8	3. 39	3. 37,79	+ 0,39	3. 38,2	18,3	49	29,9	
Nov. 1 2	24. 42	3. 42	3. 35,71	+ 0,47	3. 36,2	20,3	49	30,0	
2 3	23. 22	3. 31	3. 36,72	+ 0,47	3. 37,2	19,3	49	29,9	
3 4	23. 46	3. 34	3. 36,10	+ 0,47	3. 36,6	19,9	50	29,9	
4 5	24. 8	3. 36	3. 34,81	+ 0,47	3. 35,3	21,2	49	30,2	
5 6	24. 32	3. 44	3. 39,13	+ 0,50	3. 39,6	16,9	45	30,4	

CALCULATIONS of the Going of Mr. HARRISON's Watch from Day to Day.

	Interval of Comparisons.	Watch loſes of Clock.	Watch loſes of Clock in 24 Hours of Watch.	Clock varies from Sidereal Time per Day.	Watch loſes of Sidereal Time in 24 Hours of Watch.	Watch gets on Mean Time per Day.	Mean State of the Thermometer.	Mean State of the Barometer.
1766.	H. M.	M. S.	M. S.	S.	M. S.	S.	Deg.	Inches.
Nov. 6 to 7	23. 16	3. 32	3. 38,69	+0,50	3. 39,2	17,3	44	30,1
7 8	24. 16	3. 40	3. 37,58	+0,45	3. 38,0	18,5	43	29,8
8 9	24. 2	3. 39	3. 38,70	+0,35	3. 39,0	17,5	43	29,9
9 10	24. 3	3. 39	3. 38,55	+0,35	3. 38,9	17,6	42	30,1
10 11	23. 56	3. 38	3. 38,61	+0,30	3. 38,9	17,6	44	30,0
11 12	24. 4	3. 38	3. 37,40	+0,20	3. 37,6	18,9	45	29,8
12 13	24. 1	3. 37	3. 36,85	+0,06	3. 36,9	19,6	48	29,6
13 14	23. 59	3. 38	3. 38,15	+0,06	3. 38,2	18,3	47	29,5
14 15	23. 57	3. 38	3. 38,45	—0,01	3. 38,4	18,1	45	29,6
15 16	24. 0	3. 38	3. 38,00	—0,16	3. 37,8	18,7	45	29,7
16 17	24. 8	3. 40	3. 38,78	—0,21	3. 38,6	17,9	47	29,5
17 18	23. 58	3. 37	3. 37,30	—0,30	3. 37,0	19,5	50	29,2
18 19	23. 57	3. 37	3. 37,45	—0,43	3. 37,0	19,5	52	29,1
19 20	24. 31	3. 42	3. 37,32	—0,55	3. 36,8	19,7	52	29,3
20 21	23. 58	3. 39	3. 39,30	—0,66	3. 38,6	17,9	51	29,4
21 22	23. 38	3. 36	3. 39,37	—0,55	3. 38,8	17,7	50	29,6
22 23	23. 59	3. 39	3. 39,15	—0,45	3. 38,7	17,8	48	29,9
23 24	23. 53	3. 38	3. 39,06	—0,40	3. 38,6	17,9	48	30,1
24 25	23. 55	3. 38	3. 38,76	—0,40	3. 38,3	18,2	51	30,1
25 26	24. 8	3. 41	3. 39,78	—0,40	3. 39,4	17,1	48	30,0
26 27	24. 2	3. 41	3. 40,70	—0,30	3. 40,4	16,1	43	30,0
27 28	24. 10	3. 43	3. 41,46	—0,29	3. 41,2	15,3	41	30,2
28 29	23. 52	3. 39	3. 40,21	—0,32	3. 39,9	16,6	42	30,3
29 30	24. 3	3. 41	3. 40,54	—0,43	3. 40,1	16,4	44	30,2
30 to Dec. 1	23. 44	3. 38	3. 40,45	—0,46	3. 40,0	16,5	43	30,1
Dec. 1 2	23. 59	3. 41	3. 41,15	—0,49	3. 40,6	15,9	43	30,2
2 3	23. 52	3. 40	3. 41,23	—0,49	3. 40,7	15,8	43	30,2
3 4	24. 31	3. 46	3. 41,25	—0,49	3. 40,7	15,8	41	30,1
4 5	23. 53	3. 40	3. 41,07	—0,53	3. 40,5	16,0	40	30,1
5 6	23. 56	3. 40	3. 40,61	—0,56	3. 40,0	16,5	40	30,1
6 7	24. 0	3. 41	3. 41,00	—0,60	3. 40,4	15,1	41	30,0
7 8	24. 17	3. 44	3. 41,39	—0,64	3. 40,7	15,8	41	29,8
8 9	23. 56	3. 41	3. 41,61	—0,69	3. 40,9	15,6	40	29,8
9 10	23. 53	3. 41	3. 42,07	—0,73	3. 41,3	15,2	40	29,7
10 11	24. 3	3. 39	3. 38,55	—0,77	3. 37,8	18,7	43	29,4
11 12	23. 54	3. 37	3. 37,91	—0,83	3. 37,1	19,4	46	29,2
12 13	24. 5	3. 39	3. 38,24	—0,83	3. 37,4	19,1	45	29,5
13 14	23. 54	3. 40	3. 40,92	—0,87	3. 40,0	16,5	42	29,9
14 15	24. 3	3. 42	3. 41,54	—0,91	3. 40,6	15,9	43	29,7
15 16	24. 16	3. 42	3. 39,55	—0,96	3. 38,6	17,9	42½	29,6
16 17	23. 43	3. 39	3. 41,62	—0,88	3. 40,7	15,8	42	29,7
17 18	24. 3	3. 40	3. 39,54	—0,82	3. 38,7	17,8	41	29,4
18 19	23. 59	3. 42	3. 42,15	—0,85	3. 41,3	15,2	39	29,4
19 20	24. 4	3. 43	3. 42,38	—0,85	3. 41,5	15,0	38	29,1
20 21	23. 51	3. 40	3. 41,38	—0,92	3. 40,4	16,1	39	28,7
21 22	23. 44	3. 42	3. 44,49	—0,92	3. 44,6	11,9	39½	29,1
22 23	24. 47	3. 53	3. 45,88	—0,80	3. 45,1	11,4	38	29,7

CALCULATIONS of the Going of Mr. HARRISON's Watch from Day to Day.

	Interval of Comparifons.	Watch lofes of Clock.	Watch lofes of Clock in 24 Hours of Watch.	Clock varies from Sidereal Time per Day.	Watch lofes of Sidereal Time in 24 Hours of Watch.	Watch gets on Mean Time per Day.	Mean State of the Thermometer.	Mean State of the Barometer.
1766.	H. M.	M. S.	M. S.	S.	M. S.	S.	Deg.	Inches.
Dec. 23 to 24	23. 59	3. 48	3. 48,16	−0,80	3. 47,3	9,2	36	30,1
24 25	24. 0	3. 48	3. 48,00	−0,81	3. 47,2	9,3	36	30,2
25 26	23. 30	3. 44	3. 48,77	−0,83	3. 47,9	8,6	35	30,3
26 27	24. 4	3. 50	3. 49,36	−0,84	3. 48,5	8,0	35	30,3
27 28	23. 58	3. 49	3. 49,32	−0,86	3. 48,5	8,0	35	30,4
28 29	24. 9	3. 52	3. 50,56	−0,87	3. 49,7	6,8	37	30,4
29 30	23. 58	3. 51	3. 51,32	−0,89	3. 50,4	6,1	38	30,3
30 31	24. 1	3. 50	3. 49,84	−0,92	3. 48,9	7,6	40	30,2
31 to Jan. 1	24. 0	3. 50	3. 50,00	−0,96	3. 49,0	7,5	40	30,1
1767.								
Jan. 1 to 2	24. 5	3. 52	3. 51,20	−0,99	3. 50,2	6,3	37	29,7
2 3	24. 14	3. 59	3. 56,70	−1,03	3. 55,7	0,8	35	29,4
3 4	23. 48	3. 58	4. 0,00	−1,06	3. 58,9	− 2,4	34	29,6
4 5	23. 59	4. 4	4. 4,17	−1,15	4. 3,0	− 6,5	31	29,8
5 6	23. 52	3. 59	4. 0,34	−1,12	3. 59,2	− 2,7	31	29,6
6 7	23. 58	3. 54	3. 54,32	−1,09	3. 53,2	3,3	32	29,6
7 8	24. 44	3. 59	3. 51,91	−1,06	3. 50,8	5,7	32½	29,5
8 9	23. 19	3. 48	3. 54,61	−1,15	3. 53,4	3,1	31½	29,4
9 10	23. 53	3. 57	3. 58,16	−1,30	3. 56,8	− 0,3	28	29,5
10 11	24. 5	4. 0	3. 59,17	−1,81	3. 57,3	− 0,8	27	29,4
11 12	24. 33	3. 58	3. 52,67	−1,59	3. 51,1	− 5.4	30	29,2
12 13	23. 33	3. 50	3. 54,39	−1,51	3. 52,9	3,6	29	29,2
13 14	24. 10	3. 55	3. 53,38	−1,45	3. 51,9	4,6	31	29,0
14 15	23. 50	3. 46	3. 47,58	−1,38	3. 46,2	10,3	34	29,2
15 16	23. 55	3. 47	3. 47,79	−1,32	3. 46,5	10,0	34	29,4
16 17	23. 55	3. 49	3. 49,80	−1,58	3. 48,2	8,3	32	29,6
17 18	24. 9	3. 51	3. 49,57	−1,60	3. 48,0	8,5	31	29,7
18 19	23. 42	3. 53	3. 55,95	−1,74	3. 54,2	2,3	29	29,8
19 20	24. 21	4. 2	3. 58,52	−1,95	3. 56,6	− 0,1	25½	29,8
20 21	23. 46	3. 56	3. 58,32	−1,83	3. 56,5	0	26	29,9
21 22	25. 2	4. 2	3. 52,01	−1,36	3. 50,6	5,9	32½	29,8
22 23	23. 47	3. 37	3. 48,59	−0,94	3. 47,6	8,9	36	29,5
23 24	24. 1	3. 48	3. 47,84	−1,06	3. 46,8	9,7	35	29,8
24 25	24. 12	3. 49	3. 47,11	−1,19	3. 45,9	10,6	37	29,8
25 26	24. 2	3. 47	3. 46,69	−1,46	3. 45,2	11,3	40	29,7
26 27	23. 58	3. 45	3. 45,31	−1,72	3. 43,6	12,9	41½	29,7
27 28	24. 2	3. 46	3. 45,69	−1,96	3. 43,7	12,8	44	29,6
28 29	24. 22	3. 47	3. 43,58	−2,19	3. 41,4	15,1	44	29,7
29 30	23. 42	3. 43	3. 45,80	−2,19	3. 43,6	12,9	43	29,8
30 31	23. 59	3. 43	3. 43,15	−2,15	3. 41,0	15,5	45½	29,8
31 to Feb. 1	24. 0	3. 42	3. 42,00	−2,03	3. 40,0	16,5	47	29,8
Feb. 1 2	23. 49	3. 41	3. 42,70	−2,22	3. 40,5	16,0	48	29,9
2 3	24. 50	3. 51	3. 43,25	−2,27	3. 41,0	15,5	47	29,9
3 4	23. 23	3. 37	3. 42,72	−2,34	3. 40,4	16,1	45	29,8
4 5	24. 22	3. 47	3. 43,58	−2,44	3. 41,1	15,4	43	29,7
5 6	23. 17	3. 39	3. 45,74	−2,58	3. 43,2	13,3	41	29,6

CALCULATIONS of the Going of Mr. HARRISON's Watch from Day to Day.

		Interval of Comparisons.	Watch loses of Clock.	Watch loses of Clock in 24 hours of Watch.	Clock varies from Sidereal Time per Day.	Watch loses of Sidereal Time in 24 hours of Watch.	Watch gets on Mean Time per Day.	Mean State of the Thermometer.	Mean State of the Barometer.
1767.		H. M.	M. S.	M. S.	S.	M. S.	S.	Deg.	Inches.
Feb. 6	to 7	24. 35	3. 52	3. 46,50	—2,71	3. 43,8	12,7	41	29,5
7	8	23. 48	3. 41	3. 42,86	—2,71	3. 40,1	16,4	44	29,2
8	9	23. 47	3. 40	3. 42,00	—2,70	3. 39,3	17,2	45	29,2
9	10	24. 3	3. 43	3. 42,54	—2,63	3. 39,9	16,6	44	29,2
10	11	23. 57	3. 40	3. 40,46	—2,63	3. 37,8	18,7	45	29,3
11	12	24. 37	3. 47	3. 41,31	—2,65	3. 38,7	17,8	46	29,1
12	13	23. 20	3. 37	3. 43,20	—2,72	3. 40,5	16,0	43	29,1
13	14	24. 5	3. 44	3. 43,23	—2,75	3. 40,5	16,0	44	29,2
14	15	24. 17	3. 45	3. 42,38	—2,58	3. 39,8	16,7	46	29,3
15	16	24. 0	3. 44	3. 44,00	—2,63	3. 41,4	15,1	45	29,6
16	17	24. 10	3. 44	3. 42,46	—2,60	3. 39,8	16,7	45	29,5
17	18	24. 5	3. 40	3. 39,24	—2,52	3. 36,7	19,8	49	29,4
18	19	24. 8	3. 44	3. 42,76	—2,48	3. 40,3	16,2	46	29,7
19	20	23. 41	3. 39	3. 41,92	—2,52	3. 39,4	17,1	44	29,7
20	21	24. 21	3. 46	3. 42,75	—2,65	3. 40,1	16,4	45	29,4
21	22	23. 50	3. 40	3. 41,54	—2,60	3. 38,9	17,6	45	29,4
22	23	23. 38	3. 40	3. 43,41	—2,58	3. 40,8	15,7	43	29,6
23	24	24. 13	3. 44	3. 42,30	—2,58	3. 39,7	16,8	43	29,8
24	25	23. 51	3. 40	3. 41,38	—2,46	3. 38,9	17,6	44	29,8
25	26	24. 16	3. 41	3. 41,54	—2,41	3. 39,1	17,4	45	29,6
26	27	23. 40	3. 37	3. 40,06	—2,37	3. 37,7	18,8	47	29,4
27	28	24. 34	3. 46	3. 40,79	—2,40	3. 38,4	18,1	45	29,4
28 to Mar. 1		23. 32	3. 37	3. 41,30	—2,30	3. 39,0	17,5	44	29,7
Mar. 1	2	23. 58	3. 40	3. 40,30	—2,10	3. 38,2	18,3	45	29,8
2	3	24. 0	3. 40	3. 40,00	—2,00	3. 38,0	18,5	44	29,6
3	4	23. 55	3. 39	3. 39,76	—1,95	3. 37,8	18,7	44	29,7

COMPARISONS

COMPARISONS

OF

Mr. Harriſon's Watch with the Mean Time,

CALCULATED FROM

Obſerved Tranſits of the Sun over the Meridian

AT THE

ROYAL OBSERVATORY.

k

CONTENTS

OF THE

COLUMNS.

THE firſt column contains the day of the month; the ſecond, the obſerved tranſit of the Sun's centre over the meridian, according to the time of the tranſit clock; the third column ſhews the time by the clock, when compared with Mr. Harriſon's watch; the fourth, the apparent time at the ſame compariſon; the fifth the equation of time, which, applied to the numbers in the preceding column, gives the mean time contained in the ſixth column; the ſeventh column gives the time ſhewn by Mr. Harriſon's watch, when compared with the clock; laſtly, the eighth column ſhews how much the watch is too faſt for mean time each day.

COMPARISONS of Mr. HARRISON's Watch with Mean Time.

	Obſerved Tranſit of Sun per Clock.	Time per Clock at Compariſon with Watch.	Apparent Time.	Equation of Time.	Mean Time.	Time per Harriſon's Watch at Compariſon with Clock.	Harriſon's Watch faſt for Mean Time.
1766.	H. M. S.	H. M. S.	H. M. S.	M. S.	H. M. S.	H. M. S.	M. S.
♂ May 6.	2. 53. 30,27	3. 39. 1	0. 45. 23,60	— 3. 39,8	0. 41. 43,8	0. 42. 0	0. 16,2
☿ 7.	2. 57. 20,50	3. 12. 34	0. 15. 11,10	3. 45,0	0. 11. 26,1	0. 12. 0	0. 33,9
☽ 12.	3. 16. 43,71	3. 28. 33	0. 11. 47,38	3. 59,32	0. 7. 48,0	0. 10. 0	2. 12,0
♃ 15.	3. 28. 28,77	3. 45. 20	0. 16. 48,47	4. 1,10	0. 12. 47,4	0. 16. 0	3. 12,6
♄ 17.	3. 36. 21,83	4. 3. 34	0. 27. 7,68	3. 59,47	0. 23. 8,2	0. 27. 0	3. 51,8
☉ 18.	3. 40. 20,06	3. 54. 8	0. 13. 45,67	3. 57,97	0. 9. 47,7	0. 14. 0	4. 12,3
☿ 21.	3. 52. 15,62	4. 31. 2	0. 38. 39,94	3. 49,43	0. 34. 50,5	0. 40. 0	9. 9,5
♃ 22.	3. 56. 15,65	4. 7. 33	0. 11. 15,48	3. 45,44	0. 7. 30,0	0. 13. 0	5. 30,0
♀ 23.	4. 0. 15,43	4. 46. 9	0. 45. 45,96	3. 40,8	0. 42. 5,2	0. 48. 0	5. 54,8
♀ 30.	4. 28. 30,68	5. 26. 34	0. 57. 53,50	2. 55,62	0. 54. 57,9	1. 3. 0	8. 2,1
♄ June 7.	5. 1. 49,77	5. 19. 45	0. 17. 52,14	1. 39,8	0. 16. 12,3	0. 26. 0	9. 47,7
☉ 8.	5. 5. 58,22	5. 15. 26	0. 9. 26,15	1. 28,85	0. 7. 57,3	0. 18. 0	10. 2,7
♂ 10.	5. 14. 16,31	5. 54. 25	0. 40. 1,77	1. 5,29	0. 38. 56,5	0. 50. 0	11. 3,5
♃ 12.	5. 22. 34,75	5. 40. 18	0. 17. 40,18	0. 41,47	0. 16. 58,7	0. 29. 0	12. 1,3
♀ 13.	5. 26. 44,56	5. 36. 45	0. 9. 58,71	— 0. 29,23	0. 9. 29,5	0. 22. 0	12. 30,5
☽ 23.	6. 8. 27,69	6. 19. 14	0. 10. 44,44	+ 1. 38,68	0. 12. 23,1	0. 25. 0	12. 36,9
♂ 24.	6. 12. 38,68	6. 23. 11	0. 10. 30,49	1. 51,48	0. 12. 22,0	0. 25. 0	12. 38,0
☿ 25.	6. 16. 48,71	6. 32. 7	0. 15. 15,65	2. 4,21	0. 17. 19,9	0. 30. 0	12. 40,1
♄ 28.	6. 29. 19,16	6. 44. 48	0. 15. 26,16	2. 41,61	0. 18. 7,8	0. 31. 0	12. 52,2
☽ 30.	6. 37. 38,41	6. 45. 31	0. 7. 51,23	3. 5,34	0. 10. 56,6	0. 24. 0	13. 3,4
♂ July 1.	6. 41. 48,04	6. 58. 24	0. 16. 33,10	3. 17,0	0. 19. 50,1	0. 33. 0	13. 9,9
♄ 5.	6. 58. 24,75	7. 9. 25	0. 10. 58,36	4. 0,64	0. 14. 59,0	0. 29. 0	14. 1,0
☉ 6.	7. 2. 32,96	7. 13. 10	0. 10. 35,23	4. 10,74	0. 14. 46,0	0. 29. 0	14. 14,0
♂ 8.	7. 10. 49,37	7. 20. 34	0. 9. 42,96	4. 30,23	0. 14. 13,2	0. 29. 0	14. 46,8
☿ 9.	7. 14. 56,87	7. 32. 17	0. 17. 17,16	4. 39,47	0. 21. 56,6	0. 37. 0	15. 3,4
♃ 10.	7. 19. 4,0	7. 35. 57	0. 16. 50,12	4. 48,35	0. 21. 38,5	0. 37. 0	15. 21,5
♃ 17.	7. 47. 44,79	7. 58. 34	0. 10. 47,40	5. 36,5	0. 16. 23,9	0. 34. 0	17. 36,1
♀ 18.	7. 51. 49,02	7. 58. 14	0. 6. 23,80	5. 41,3	0. 12. 5,1	0. 30. 0	17. 54,9
♄ 19.	7. 55. 52,59	8. 1. 53	0. 5. 59,40	5. 45,6	0. 11. 45,0	0. 30. 0	18. 15,0
☉ 20.	7. 59. 55,40	8. 7. 33	0. 7. 36,32	5. 49,4	0. 13. 29,7	0. 32. 0	18. 34,3
♀ 25.	8. 20. 2,06	8. 26. 51	0. 6. 47,81	6. 0,0	0. 12. 47,8	0. 33. 0	20. 12,2
♃ 31.	8. 43. 52,41	9. 12. 53	0. 28. 55,81	5. 52,9	0. 34. 48,7	0. 57. 0	22. 11,3
♄ Auguſt 2.	8. 51. 46,27	9. 17. 15	0. 25. 24,58	5. 45,90	0. 31. 10,48	0. 54. 0	22. 49,52
☉ 3.	8. 53. 58,19	9. 19. 13	0. 25. 10,77	5. 41,50	0. 30. 52,27	0. 54. 0	23. 7,73
♂ 5.	9. 1. 38,81	9. 37. 32	0. 35. 47,50	5. 31,02	0. 41. 18,5	1. 5. 0	23. 41,5
♃ 7.	9. 9. 17,04	9. 25. 50	0. 16. 30,35	5. 18,27	0. 21. 48,6	0. 46. 0	24. 11,4

COMPARISONS of Mr. HARRISON's Watch with Mean Time.

	Obſerved Tranſit of the Sun per Clock.	Time per Clock at Compariſon with Watch.	Apparent Time.	Equation of Time.	Mean Time.	Time per Harriſon's Watch at Compariſon with Clock.	Harriſon's Watch faſt for Mean Time.
1766.	H. M. S.	H. M. S.	H. M. S.	M. S.	H. M. S.	H. M. S.	M. S.
☽ Auguſt 11.	9. 24. 24,25	9. 29. 36	0. 5. 10,93	+ 4. 46,3	0. 9. 57,2	0. 35. 0	25. 2,8
☉ 17.	9. 46. 50,87	9. 57. 7	0. 10. 14,54	3. 40,93	0. 13. 55,5	0. 40. 0	26. 4,5
☿ 20.	9. 57. 58,06	10. 8. 22	0. 10. 22,35	3. 1,2	0. 13. 23,5	0. 40. 0	26. 36,5
♃ 21.	10. 1. 39,28	10. 21. 8	0. 19. 25,75	2. 46,8	0. 22. 12,5	0. 49. 0	26. 47,5
♀ 22.	10. 5. 20,03	10. 21. 52	0. 16. 29,45	2. 32,13	0. 19. 1,6	0. 46. 0	26. 58,4
♄ 23.	10. 9. 0,15	10. 21. 35	0. 12. 32,94	2. 17,06	0. 14. 50,0	0. 42. 0	27. 10,0
♂ 26.	10. 19. 59,06	10. 34. 46	0. 14. 44,71	1. 28,5	0. 16. 13,2	0. 44. 0	27. 46,8
♃ 28.	10. 27. 16,34	10. 51. 17	0. 23. 57,04	0. 54,0	0. 24. 51,0	0. 53. 0	28. 9,0
☉ 31.	10. 38. 9,09	10. 51. 27	0. 13. 15,90	+ 0. 0,2	0. 13. 16,1	0. 42. 0	28. 43,9
☿ Sept. 3.	10. 48. 58,50	11. 20. 38	0. 31. 34,76	− 0. 56,75	0. 30. 38,0	1. 0. 0	29. 22,0
♃ 4.	10. 52. 34,25	11. 19. 19	0. 26. 40,76	1. 16,09	0. 25. 24,7	0. 55. 0	29. 35,3
☉ 7.	11. 3. 20,00	11. 36. 24	0. 32. 59,08	2. 16,3	0. 30. 42,8	1. 1. 0	30. 17,2
♂ 9.	11. 10. 29,15	11. 23. 45	0. 13. 13,88	2. 56,3	0. 10. 17,6	0. 41. 0	30. 42,4
♀ 12.	11. 21. 11,25	11. 33. 53	0. 12. 39,86	3. 57,67	0. 8. 42,2	0. 40. 0	31. 17,8
♄ 13.	11. 24. 45,62	11. 42. 38	0. 17. 49,73	4. 18,2	0. 13. 31,5	0. 45. 0	31. 28,5
☽ 15.	11. 31. 53,21	11. 48. 4	0. 16. 8,39	4. 59,97	0. 11. 8,4	0. 43. 0	31. 51,6
♂ 16.	11. 35. 27,10	11. 45. 46	0. 10. 17,37	5. 20,89	0. 4. 56,5	0. 37. 0	32. 3,5
♃ 18.	11. 42. 34,56	12. 7. 13	0. 24. 34,78	6. 2,8	0. 18. 32,0	0. 51. 0	32. 28,0
♀ 19.	11. 46. 8,69	12. 0. 54	0. 14. 43,12	6. 23,55	0. 8. 19,6	0. 41. 0	32. 40,4
♄ 20.	11. 49. 42,50	12. 2. 37	0. 12. 52,59	6. 44,3	0. 6. 8,3	0. 39. 0	32. 51,7
☉ 21.	11. 53. 16,62	12. 5. 20	0. 12. 1,60	7. 5,1	0. 4. 56,5	0. 38. 0	33. 3,5
☽ 22.	11. 56. 50,78	12. 12. 2	0. 15. 8,97	7. 25,95	0. 7. 43,0	0. 41. 0	33. 17,0
♃ 25.	12. 7. 33,75	12. 40. 12	0. 32. 33,39	8. 27,6	0. 24. 5,8	0. 58. 0	33. 54,2
♀ 26.	12. 11. 8,50	12. 26. 53	0. 15. 42,16	8. 47,45	0. 6. 54,7	0. 41. 0	34. 5,3
☉ 28.	12. 18. 18,53	12. 30. 19	0. 11. 58,67	9. 27,0	0. 2. 31,7	0. 37. 0	34. 28,3
☽ 29.	12. 21. 54,21	12. 40. 4	0. 18. 7,07	9. 46,0	0. 8. 21,1	0. 43. 0	34. 38,9
☽ October 6.	12. 47. 14,31	13. 13. 13	0. 25. 54,75	11. 54,5	0. 14. 0,2	0. 50. 0	35. 59,8
♂ 7.	12. 50. 53,06	13. 4. 55	0. 13. 59,81	12. 11,3	0. 1. 48,5	0. 38. 0	36. 11,5
☉ 12.	13. 9. 10,52	13. 21. 26	0. 12. 13,61	13. 27,8	23. 58. 45,8	0. 36. 0	37. 14,2
☽ 13.	13. 12. 51,00	13. 37. 9	0. 24. 14,28	13. 42,0	0. 10. 32,3	0. 48. 0	37. 27,7
♂ 14.	13. 16. 32,31	13. 58. 52	0. 42. 13,21	13. 55,8	0. 28. 17,4	1. 6. 0	37. 42,6
♄ 18.	13. 31. 24,46	14. 7. 28	0. 35. 57,92	14. 44,7	0. 21. 13,2	1. 0. 0	38. 46,8
☉ 19.	13. 35. 9,37	14. 2. 5	0. 26. 51,43	14. 55,2	0. 11. 56,2	0. 51. 0	39. 3,8
☽ 20.	13. 38. 54,65	14. 6. 42	0. 27. 43,00	15. 5,2	0. 12. 37,8	0. 52. 0	39. 22,2
☿ 22.	13. 46. 27,84	13. 58. 54	0. 12. 24,20	15. 23,0	23. 57. 1,2	0. 37. 0	39. 58,8
♀ 24.	13. 54. 4,06	14. 13. 8	0. 19. 0,91	15. 38,4	0. 3. 22,5	0. 44. 0	40. 37,5
☉ 26.	14. 1. 42,87	14. 18. 18	0. 16. 32,49	15. 50,9	0. 0. 41,6	0. 42. 0	41. 18,4

COMPARISONS of Mr. HARRISON's Watch with Mean Time.

	Obſerved Tranſit of the Sun per Clock.	Time per Clock at Compariſon with Watch.	Apparent Time.	Equation of Time.	Mean Time.	Time per Harriſon's Watch at Compariſon with Clock.	Harriſon's Watch faſt for Mean Time.
1766.	H. M. S.	H. M. S.	H. M. S.	M. S.	H. M. S.	H. M. S.	H. M. S.
☿ Oct. 29.	14. 13. 17,68	14. 28. 4	0. 14. 43,93	— 16. 4,86	23. 58. 39,1	0. 41. 0	42. 20,9
♃ 30.	14. 17. 11,22	14. 52. 42	0. 35. 25,01	16. 7,88	0. 19. 17,1	1. 2. 0	42. 42,9
♄ Nov. 1.	14. 25. 0,10	14. 39. 52	0. 14. 49,49	16. 11,3	23. 58. 38,2	0. 42. 0	43. 21,8
☽ 3.	14. 32. 52,09	14. 51. 5	0. 18. 9,91	16. 11,5	0. 1. 58,4	0. 46. 0	44. 1,6
♃ 6.	14. 44. 46,15	15. 28. 1	0. 43. 7,74	16. 5,4	0. 27. 2,3	1. 12. 0	44. 57,7
☉ 9.	14. 56. 47,87	15. 12. 52	0. 16. 1,43	15. 52,5	0. 0. 8,9	0. 46. 0	45. 51,1
♃ 13.	15. 13. 3,13	15. 31. 24	0. 18. 17,75	15. 22,1	0. 2. 55,6	0. 50. 0	47. 4,4
♀ 14.	15. 17. 9,28	15. 34. 2	0. 16. 49,84	15. 12,6	0. 1. 37,2	0. 49. 0	47. 22,8
♄ 22.	15. 50. 29,68	16. 10. 9	0. 19. 35,87	13. 26,67	0. 6. 9,2	0. 56. 0	49. 50,8
♃ 27.	16. 11. 46,65	16. 25. 26	0. 13. 36,92	11. 54,8	0. 1. 42,1	0. 53. 0	51. 17,9
♀ 28.	16. 16. 4,13	16. 39. 9	0. 23. 0,75	11. 34,53	0. 11. 26,2	1. 3. 0	51. 33,8
☉ 30.	16. 24. 41,81	16. 41. 29	0. 16. 44,18	10. 50,6	0. 5. 53,6	0. 58. 0	52. 6,4
☽ Dec. 8.	16. 59. 37,31	17. 22. 59	0. 23. 17,43	7. 33,48	0. 15. 44,0	1. 10. 0	0. 54. 16,0
♂ 9.	17. 4. 1,65	17. 22. 40	0. 18. 34,94	7. 6,57	0. 11. 28,4	1. 6. 0	0. 54. 31,6
♂ 23.	18. 6. 14,90	18. 33. 19	0. 26. 59,09	— 0. 17,6	0. 26. 41,5	1. 25. 0	0. 58. 18,5
☿ 24.	18. 10. 42,06	18. 36. 7	0. 25. 20,24	+ 0. 12,53	0. 25. 32,8	1. 24. 0	0. 58. 27,2
1767. ♄ January 3.	18. 55. 9,50	19. 13. 32	0. 18. 19,12	5. 4,12	0. 23. 23,2	1. 23. 0	0. 59. 36,8
☽ 12.	19. 34. 39,03	20. 0. 9	0. 25. 25,37	8. 53,57	0. 34. 18,9	1. 34. 0	0. 59. 41,1
♀ 30.	20. 51. 1,62	20. 38. 2	23. 47. 2,61	13. 48,1	0. 0. 50,7	1. 3. 0	1. 2. 9,3
☉ Feb. 1.	20. 59. 16,21	20. 44. 27	23. 45. 13,22	14. 5,0	23. 59. 18,2	1. 2. 0	1. 2. 41,8
☽ 2.	21. 3. 22,43	20. 37. 8	23. 33. 50,03	14. 12,3	23. 48. 2,3	0. 51. 0	1. 2. 57,7
♂ 3.	21. 7. 27,71	21. 30. 59	0. 23. 27,30	14. 19,1	0. 37. 46,4	1. 41. 0	1. 3. 13,6
☽ 23.	22. 26. 36,31	22. 9. 8	23. 42. 32,96	13. 44,95	23. 56. 17,9	1. 5. 0	1. 8. 42,1
♀ 27.	22. 41. 52,56	22. 23. 53	23. 42. 3,28	13. 5,37	23. 55. 8,6	1. 5. 0	1. 9. 51,4
☉ March 1.	22. 49. 27,36	22. 37. 16	23. 47. 50,40	12. 42,1	0. 0. 32,5	1. 11. 0	1. 10. 27,5

APPENDIX.

CONTAINING

OBSERVATIONS

OF

EQUAL ALTITUDES OF THE SUN

TAKEN AT

PORTSMOUTH, JAMAICA, AND BARBADOES,

ACCORDING TO

THE TIME OF MR. HARRISON'S WATCH,

UPON

The Two VOYAGES made to the WEST INDIES for the Trial of the ſame.

PUBLISHED BY ORDER OF

THE COMMISSIONERS OF LONGITUDE.

The times ſhewn by Mr. Harriſon's watch, when the Sun had equal altitudes, as obſerved at the Royal Academy at Portſmouth.

By J. ROBERTSON.

October 28, 1761.

Morning.		Afternoon.		
The Sun's preceding limb.	Following limb.	The Sun's preceding limb.	Following limb.	
H. M. S.	H. M. S.	H. M. S.	H. M. S.	
8. 54. 58	8. 59. 52 Doubtful.	2. 27. 49½	2. 32. 57½	The Sun's altitude about 12°.
8. 58. 00	Clouds.	2. 30. 59	2. 36. 04	
Clouds.	Clouds.	2. 34. 06	Cloudy.	

N. B. Mr. John Howe (brother-in-law to Lord Howe) one of the gentlemen to whom the calculation of theſe obſervations was referred by the Board of Longitude, remarked, that the Sun's altitude, though ſet down only about 12° to the obſervation above, ſhould be 16 or 17°, certainly 16° at leaſt.

October 29, 30, 31. Cloudy.

November 1. Cloudy in the afternoon.

November

November 2, 1761.

Morning.		Afternoon.		
The Sun's preceding limb.	Following limb.	The Sun's preceding limb.	Following limb.	
H. M. S.	H. M. S.	H. M. S.	H. M. S.	
9. 7. 18	9. 12. 43	Clouds.	2. 19. 08½	The Sun's altitude about 15°. Thick atmoſphere under the Sun in the morning.
9. 10. 34½	Clouds.	2. 16. 59	2. 22. 28½	
9. 13. 54	9. 19. 30	2. 20. 20½	2. 25. 44½	

November 5, 1761.

H. M. S.	H. M. S.		H. M. S.
9. 25. 32½	9. 31. 34½	Clouds.	Clouds.
9. 29. 11	9. 35. 20½	Clouds.	Clouds.
9. 32. 54	9. 39. 14	Clouds.	2. 7. 31½

November 6, 1761.

H. M. S.	H. M. S.	H. M. S.	H. M. S.
9. 25. 48½	9. 31. 54	1. 53. 35½ Doubtful.	Clouds.
9. 29. 30	9. 35. 41	Clouds.	2. 3. 44
9. 33. 12½	9. 39. 34	2. 1. 21½	2. 7. 24½

The times ſhewn by Mr. Harriſon's watch, when the Sun had equal altitudes, as obſerved at Port Royal in Jamaica.

January 26, 1762.

Morning.		Evening.	
The Sun's preceding limb.	Following limb.	The Sun's preceding limb.	Following limb.
H. M. S.	H. M. S.	H. M. S.	H. M. S.
2. 20. 42½	2. 23. 38½	- - -	8. 0. 27½
2. 22. 28	2. 25. 25½	7. 59. 17	8. 2. 14
2. 24. 16	2. 27. 14	- - -	8. 4. 2

Obſervations of equal altitudes of the Sun, compared with Mr. Harriſon's watch, taken at the Royal Academy at Portſmouth Dock-yard.

April 2, 1762.

Morning.		Afternoon.	
The Sun's preceding limb.	Following limb.	The Sun's preceding limb.	Following limb.
H. M. S.	H. M. S.	H. M. S.	H. M. S.
8. 53. 50½	8. 57. 58	- - -	- - -
56. 21½	9. 0. 32½	- - -	2. 54. 34½
58. 54½	3. 7	2. 52. 55½	57. 5½

J. Robertson.

Equal altitudes of the Sun, taken at the Obſervatory in Portſmouth, according to the time of Mr. Harriſon's watch.

February 29, 1764.

The Sun's altitude about 21°.

	H. M. S.	H. M. S.	H. M. S.	H. M. S.	H. M. S.	H. M. S.
Morning obſervation.	9. 19. 58	9. 23. 1	9. 24. 39½	9. 26. 5½	9. 27. 44½	9. 30. 52
Afternoon obſervation.	3. 15. 18	3. 12. 15½	3. 10. 39 :	3. 9. 10½	Cloudy.	Cloudy.

Note, The obſervation marked : is a dubious one.

The watch was compared with the clock in the Obſervatory, and found 4′. 26″ faſter than the ſame.

March 7, 1764.

The Sun's altitude about 21¼°.

	H. M. S.	H. M. S.	H. M. S.	H. M. S.	H. M. S.	H. M. S.
Morning obſervation.	9. 3. 4½	9. 5. 53½	9. 7. 22½	9. 8. 44	9. 10. 14	9. 14. 5 :
Afternoon obſervation.	Cloudy.	Cloudy.	Cloudy.	3. 24. 10½	3. 22. 41 :	3. 19. 48

Note, The obſervations marked : are dubious.

The watch was compared with the clock in the Obſervatory, and found 4′. 43″½ faſter than the ſame.

March 14, 1764.

The Sun's altitude about 24½°.

	H. M. S.	H. M. S.	H. M. S.	H. M. S.	H. M. S.	H. M. S.
Morning obſervation.	9. 7: 3½	9. 9. 53	9. 11. 21	9. 12. 42	9. 14. 12½	9. 17. 4
Afternoon obſervation.	3. 22. 37½	3. 19. 49	3. 18. 20 :	3. 16. 58½ :	3. 15. 29	3. 12. 37 :

Note, The obſervations marked : are dubious.

The watch was compared with the clock in the Obſervatory, and found 4′. 59″½ faſter than the ſame.

March 21, 1764.

The Sun's altitude about 26°.

	H. M. S.	H. M. S.	H. M. S.	H. M. S.	H. M. S.	H. M. S.
Morning obſervation.	9. 2. 1	9. 4. 45½	9. 6. 10½	9. 7. 28½	9. 8. 57½	9. 11. 43
Afternoon obſervation.	Cloudy.	3. 21. 9½	3. 19. 43	3. 18. 24½	3. 16. 57½	3. 14. 11

The watch was compared with the clock in the Obſervatory, and found 5′. 12″ faſter than the ſame.

Portſmouth, March 26, 1764.

This morning Mr. Harriſon's watch was compared with the clock in the Obſervatory, and found 5 minutes and 19 ſeconds faſter than the ſame.

Copy of Mr. Harriſon's declaration of the rate of the going of the time-keeper, to the Board of Longitude. Dated at Portſmouth, March 26, 1764.

My Lords and Gentlemen,

In obedience to your inſtructions, dated the 9th of Auguſt, 1763, I humbly certify, That I do expect the rate of the going of the time-keeper will be as followeth; viz.

When the thermometer is at 42, it will gain 3 ſeconds in every 24 hours:

When the thermometer is at 52, it will gain 2 ſeconds in every 24 hours:

When the thermometer is at 62, it will gain one ſecond in every 24 hours:

When the thermometer is at 72, it will neither gain nor loſe:

When the thermometer is at 82, it will loſe one ſecond in every 24 hours.

Since my laſt voyage we have made ſome improvement in the time-keeper; in conſequence of which, the proviſion to counterbalance

balance the effects of heat and cold has been made a-new; and for the want of a little more time, we could not get it quite adjuſted; for which reaſon, the above allowances are neceſſary.

This is its preſent ſtate; and as the inequalities are ſo ſmall, I will abide by the rate of its gaining, on a mean, one ſecond a day for the voyage.

I would not be underſtood that it will always require ſo long time to bring thoſe machines to perfection; for it is well known to be much harder to beat out a new road, than it is to follow that road when made.

During the time of this experiment, the mean height of the thermometer ſhall be each day carefully noted down, and certified, which I will lay before the Board at my return.

I am, &c.

WILL^{M}. HARRISON.

N. B. The ſcale of the thermometer here meant is Fahrenheit's.

A Copy.
J^{O}. IBBETSON.

Equal altitudes of the Sun taken at the Obſervatory near Bridge-Town, in the Iſland of Barbadoes, according to the time of Mr. Harriſon's watch.

The latitude of the place 13°. 5′ N.

Sunday, May 13, 1764.

Mr. William Harriſon arrrived with his father Mr. John Harriſon's watch at Barbadoes, in his Majeſty's ſhip Tartar, Sir John Lindſay, captain.

Monday, May 14.

Early this morning Mr. Harriſon brought the watch on ſhore. Mr. Nevil Maſkelyne, F. R. S. took equal altitudes of the Sun's limbs, noting the time by the watch, as follows:

H. M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	
12. 22. 19½	23. 42½	24. 34	25. 6 :	25. 58 ::	27. 21 ::	Morning. Thermometer 83.
7. 32. 7½ :	30. 46	29. 54½	29. 22½	28. 31	Clouds.	Afternoon. Thermometer 85.

N. B. The obſervations marked thus : are dubious, and thoſe marked thus :: are very dubious.

At 3¼ p. m. the watch was 4 h. 2 m. 2 ſ. faſter than the Obſervatory clock.

Tueſday,

Tueſday, May 15, 1764.

Mr. Charles Green took equal altitudes of the Sun, noting the time by the watch, as follows:

H. M. S.	M. S.	M. S.	M. S.	M. S.	M. S.		
11. 37. 50	39. 14	40. 4½	40. 38	41. 28¾	42. 53	Morning.	Thermometer 81.
8. 16. 31	15. 7	14. 16	13. 43	12. 52	11. 28	Afternoon.	Thermometer 85.

At 4¼ p. m. the watch was 4 h. 1 m. 59¼ ſ. faſter than the Obſervatory clock.

Wedneſday, May 16.

Mr. Nevil Maſkelyne took equal altitudes of the Sun, noting the time by the watch, as follows:

H. M. S.	M. S.	M. S.	H. M. S.	M. S.	M. S.		
11. 51. 55	53. 20	54. 11½	54. 44	55. 35	56. 58½	Morning.	Thermometer 80.
8. 2. 21	0. 58	0. 6	7. 59. 33½	58. 42	57. 18½	Afternoon.	Thermometer 87.

At 4 h. p. m. the watch was 4 h. 2 m. 1 ſ. faſter than the Obſervatory clock.

Thurſday, May 17.

Mr. Charles Green took equal altitudes of the Sun, noting the time by the watch, as follows:

H. M. S.	M. S.	M. S.	M. S.	M. S.	M. S.		
11. 37. 18	38. 42	39. 33½	40. 6½	40. 57½	42. 22	Morning.	Thermometer 81.
8. 17. 0	15. 35 :	14. 45	14. 11	Clouds.	Clouds.	Afternoon.	Thermometer 86.

Note, The obſervation marked : is a dubious one.

At 4¾ p. m. the watch was 4 h. 2 m. 2¾ ſ. faſter than the Obſervatory clock.

From nine emerſions of the firſt ſatellite of Jupiter, obſerved by Meſſrs. Maſkelyne and Green, at Barbadoes, and compared by the help of Wargentin's tables with five emerſions of the ſame ſatellite obſerved by Mr. John Bradley at Portſmouth, and with two obſerved at the Royal Obſervatory, equal teleſcopes of two feet, made by Mr. John Bird, being uſed by all the obſervers, the difference of meridians of Portſmouth and Barbadoes came out 3 h. 54 m. 20 ſ. according to the calculations made by the gentlemen to whom this matter was referred by the Board of Longitude.

FINIS.

INV 5956

4240254